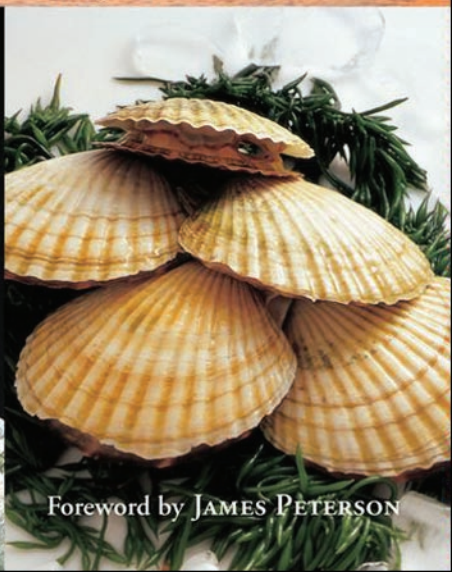
SEAFOOD HANDBOOK

The Comprehensive Guide to Sourcing, Buying, and Preparation

SECOND EDITION

FROM THE EDITORS OF *Seafood Business*



Foreword by JAMES PETERSON

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WILEY

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Foreword

A Tool for Professionals

Let the *Seafood Handbook* Expand Your Comfort Zone

By James Peterson

Few subjects are as perplexing to cooks as seafood. There are so many unfamiliar varieties (at least when we're lucky!) that we tend to stick to old favorites like salmon, tuna and halibut.

When working on my own seafood book, *Fish and Shellfish*, I discovered as I went along — trying different cooking techniques and applying different flavor profiles — that my favorite way to eat fish was raw. Not all fish are appropriate for eating raw (swordfish is a good example), but the great majority are and, when tasted unadorned, reveal stunning nuances of flavor that are lost when cooked.

In any case, one has to be a bit brave to try some squiggly thing that only moments ago was alive. But the courage to try something new is always well rewarded.

There's plenty of room for adventure in the realm of cooked seafood as well, with exotic finfish and shellfish coming into the market from all corners of the globe. The key to a satisfying experience with seafood — be it an unfamiliar item like moi or an old standard like haddock — is quality, starting the minute the fish is harvested and carrying through till it lands on a plate.

Few of us know how to tell if seafood is really fresh, leaving us open to all sorts of scams. We don't know where most species come from, nor what special handling they may require.

The *Seafood Handbook* is a concise, well-illustrated book that answers all of our questions about sourcing, selecting, handling and

Photo by Zelik Mintz

preparing seafood with text, charts and photos. This Second Edition builds on the original with new chapters on hot-button issues in the seafood industry, including sustainable-seafood purchasing, the health benefits of eating seafood and aquaculture, an expanding global source of supply. Most of the finfish and shellfish species we're likely to encounter are found in the *Seafood Handbook*, and this Second Edition offers 10 new additions. As in the first edition, color illustrations depict the whole fish or shellfish and photographs show the seafood in prepared form. In the top left corner of the introductory page for each species is a list of what the fish or shellfish is called in foreign languages, a boon for anyone sourcing or cooking overseas.

The *Seafood Handbook* also includes two large illustrated posters that provide quick reference for scientific names, nutrition facts and texture and flavor profiles of selected fish and shellfish.

This book will enable users to make and serve healthful meals by sourcing the freshest seafood available instead of just the most familiar.

The *Seafood Handbook* does not emphasize recipes — it's not really a cookbook — but trusts that the cook has basic cooking skills. Instead of recipes, a Cooking Tips section suggests the best cooking method for given categories of seafood. A chart accompanying the individual species shows at a glance the most appropriate cooking method. Under Arctic char, for example, we see that all cooking methods are appropriate except frying. (Arctic char has a high fat content that makes frying too rich, but it's ideal for smoking.)

In short, this *Seafood Handbook* is a solid reference tool that has a place in every professional setting where seafood is sold or served. It's probably the most useful guide ever written about seafood because it really shows in depth the great variety of seafood available to us.

Acclaimed cookbook writer, teacher and culinary consultant James Peterson, a native Californian, developed his cooking skills while working in top restaurants in France. He honed his own style in New York as a partner in a small Greenwich Village French restaurant called Le Petit Robert. After it closed in 1984, Peterson taught cooking at the French Culinary Institute and later at what is now the Institute for Culinary Education. His first book, *Sauces*, published in 1991, won the James Beard Cookbook of the Year Award. Among the books that followed was the award-winning *Fish and Shellfish* and a series of single-subject books, including *Simply Salmon* and *Simply Shrimp*. His most recent books include *What's a Cook to Do?* for beginning and moderate-level cooks and *Cooking*, winner of a James Beard award for best general cookbook.

Preface

Your Seafood Syllabus

A Guide to the Complex World of Finfish and Shellfish

This Second Edition of the *Seafood Handbook* is designed to expand your education in the workings of the seafood industry, from boat or farm to plate. But before you delve into the details of successful seafood sourcing and selling, it's useful to look at some of the big-picture aspects of the industry that are new to this edition:

Health

Continuing research shows without a doubt that eating seafood benefits human health — see how on page 3.

Sustainability

Responsible harvesting is an ethic that now guides every segment of the industry. Find out how your business can adopt a sustainable-seafood purchasing program on page 5.

Aquaculture

As demand from exploding global populations puts evermore pressure on wild stocks, farming operations are ramping up to supplement seafood supplies. For a crash course on aquaculture, see page 9.

The real heart of the *Seafood Handbook* begins on page 51 with separate Finfish and Shellfish sections. There you'll find everything you need to know about sourcing, preparing and marketing 210 different seafood species — *10 of them brand new to this edition*. The additions, harvested from salt

and fresh water in the wild, as well as from farms around the globe, are these:

1. *Barramundi*
2. *Carp*
3. *Cobia*
4. *Marlin*
5. *Shad*
6. *Yellow perch*
7. *Walleye*
8. *Cockle*
9. *Rock (peekytoe) crab*
10. *Spanner crab*

Before you become familiar with the amazing array of seafood species available to you, you'll learn about harvesting methods and the distribution chain (pages 12 to 15). Then discover the vast range of seafood product forms on the market and learn which are best suited for your business's needs and budget. This extensive section, starting on page 17, details:

- **Finfish:** From live to steaks, fillets and loins.
- **Surimi seafood:** A versatile whitefish substance that mimics several shellfish — and even lox.
- **Crab:** The many product options Alaska and blue crab offer.
- **Shrimp:** Sizing, frozen packs and terminology.
- **Value added:** A look at the many ways seafood is enhanced by secondary processors, from battered and breaded to burgers and prepared entrées.
- **Smoked:** A look at cold- and hot-smoking techniques.
- **Frozen seafood:** A primer on freezing methods, including a glossary of terms and guide to thawing.

Once you're familiar with the vast array of seafood products, the next obvious step is preparation, covered on pages 35 through 42 and ending with a guide to sushi and sashimi.

Since seafood is highly perishable, proper handling is of paramount importance. Starting on page 43 you'll find a discussion of seafood-safety hazards and ways to avoid them. A quality guide on page 49 tells you what to look for when buying fresh fish and shellfish and frozen seafood.

A glossary of seafood market terms and an expanded index complete this comprehensive guide to the global seafood supply.

There's No Protein Like It

Flavor, Variety, Health Benefits and Mystique — Seafood's Got It All

Seafood is unique among proteins. Red meat is red meat, no matter what breed of cattle. With poultry, there's white or dark meat, and pork is "the other white meat." But seafood comes in an astounding array of flavors, colors and textures — from delicate, snow-white flounder fillets to bright-orange, buttery sides of salmon to meaty, deep-red tuna steaks.

And that's just the finfish side of the seafood equation. Shellfish offers a whole other world of possibilities. Sweet, succulent shrimp, briny oysters, melt-in-your-mouth sea scallops and toothsome calamari are just a few of the options.

All this seafood comes from farms and fisheries in every corner of the globe. And it comes in a vast range of product forms, both fresh and frozen. Moving such a huge volume of seafood through the market presents a staggering quality-control and food-safety challenge.

But this global bounty also offers endless opportunities for seafood merchandisers, be they chefs, retailers, processors or distributor reps. This new second edition was designed to address challenges and opportunities inherent in buying and selling seafood.

Much of the information presented here was gleaned from the collective expertise of the editors at *Seafood Business*, the only monthly publication serving all segments of the U.S. seafood industry.

A couple of features in the species pages warrant special mention.

Nomenclature

An important safeguard against product fraud is the Food and Drug Administration's Seafood List (www.cfsan.fda.gov/~frf/seaintro.html), a roster of acceptable market names for imported and domestically produced seafood. Around 1,600 fish and shellfish species are on the list.

The FDA recommends using the market name or common name on seafood labels to comply with its regulations and those of the National Marine Fisheries Service. Market names, scientific names and common names from the Seafood List are given for the species in this handbook to help buyers ensure that they're getting what they paid for. Because seafood is a global commodity, names are also given in French, German, Italian, Japanese and Spanish.

Nutrition

Health-conscious consumers read food labels, so nutrition facts are important, especially for seafood, touted as a healthful choice. Values for calories, total fat, saturated fat, cholesterol, sodium, protein and the all-important omega-3s are shown.

For most species, the nutrition facts come from the U.S. Department of Agriculture's Nutrient Data Laboratory (www.cfsan.fda.gov/~frf/seaintro.html) and reflect a 100-gram, or 3.5-ounce, portion size. For species not included in the USDA database, we turned to other sources, such as Joyce A. Nettleton, D.Sc., R.D., whose book "Seafood Nutrition" includes nutrient composition of finfish and shellfish. In some cases, suppliers' in-house lab research provided the information. Sources are noted under each Nutrition Facts list.

Global Supply

A world map for each species offers a visual cue as to the range of the resource and whether the supply is farmed or wild — or both, as is often the case. The Global Supply section draws on distribution maps from the Food and Agriculture Organization as well as information gleaned from seafood marketing boards and government agencies.

The maps are intended to show the primary source of supply to the U.S. market. For a fish like farmed hamachi, the sole source is Japan. Highly migratory fish like swordfish and yellowfin tuna make a big splash all across the map, since they're caught on the high seas. That's why the list of major producers doesn't reflect a species' entire range on the map.

Now you're ready to start your education in sourcing, buying and preparing seafood, the most complex and exciting protein there is.

Seafood Is Good for You

Benefits Far Outweigh the Risks of Eating Fish

Seafood is a smart choice for health-conscious consumers. It's a lean protein that delivers a host of health benefits through omega-3s, the super-polyunsaturated fats found in fish oil. Ounce for ounce, fish and shellfish generally are lower in saturated fat than other meat proteins (only chicken breast is lower), and fewer of the calories in seafood are from fat (see Figure 1).

Most seafood is also low in cholesterol, another big concern for those trying to maintain a healthy diet. Cholesterol on its own is not a big threat unless high levels appear in foods that are also high in saturated fat. Even seafood items with relatively high cholesterol levels, such as shrimp, at 152 milligrams per 3.5-ounce serving, have very low levels of saturated fat.

Atlantic salmon, high in saturated fat as seafood goes, still comes in under other proteins and provides a whopping 1.9 grams of beneficial omega-3s.

Omega-3s are a class of fatty acids essential to health, but the human body can't manufacture them; they must be obtained from the oils in certain foods, including fish, nuts and plants, such as soybeans and flax. Also called PUFAs, these polyunsaturated fatty acids aid many of the body's functions, and they have been found also to protect against heart disease and stroke, certain types of cancers and neurological disorders, among a host of other benefits (see list on page 4).

Fish contain two types of omega-3s, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) that provide the greatest health benefits. Oil-rich fish like salmon, mackerel and herring have the highest levels of omega-3s (see Figure 2).

Lean white-fleshed fish like haddock and flounder contain lower amounts of the fatty acids, as do most shellfish.

The connection between omega-3s and heart health was first made in the 1970s by Scandinavian

Figure 1

Compare the Benefits

Product	Protein grams	Calories	Fat Calories	Total Fat g.	Sat. Fat g.	Chol. mg.
Softshell clams	10.7	65	11	1.2	0.2	25
Sea scallops	16.2	87	7	0.8	0.1	36
Haddock	18.9	87	7	0.7	0.1	57
Atlantic salmon	19.9	183	98	10.9	2.2	59
Shrimp (mixed species)	20.3	106	15	1.7	0.3	152
Yellowfin tuna	23.4	108	8	0.9	0.2	4
Chicken thigh	17.2	211	138	15.3	4.4	84
Ground beef (80% lean)	17.2	254	180	20	7.8	71
Leg of lamb	18.2	215	137	15.2	7.3	66
Center loin pork chop	20.7	170	81	9.0	2.9	49
Chicken breast	20.9	172	84	9.3	2.7	64
Top round steak	22.1	180	86	9.5	3.6	59

Source: USDA, 3.5-ounce raw portion

researchers who found a low incidence of heart disease among Greenland's Inuits, whose diet was rich in seafood. Since then, there's been a tremendous amount of research associating omega-3s with reduced risk of cardiovascular disease.

In 2000, the American Heart Association recommended that healthy adults eat fish, particularly fatty fish, at least twice a week.

The brain may also benefit from regular seafood consumption. For example, eating fish during pregnancy appears to aid fetal brain development, according to a Harvard Medical School study.

Along with all the good news about the health benefits of eating seafood came ominous reports about the dangers of eating fish containing methylmercury, a neurotoxin known to harm fetal brain development. Methylmercury is highly concentrated in long-lived, predatory fish. A 2004 advisory from the U.S. Food and Drug Administration and Environmental Protection Agency urged pregnant and nursing women, women of childbearing age and young children to avoid eating shark, tilefish, swordfish and king mackerel and limit canned albacore-tuna consumption to 6 ounces per week.

The piece that gets lost amid the warnings is that methylmercury is a hazard only to the segments of the population addressed by the advisory, and the U.S. Department of Agriculture still urges this group to eat up to 12 ounces (two to four servings) a week of a variety of seafood.

For consumers not in the advisory group, the nutritional benefits of eating seafood far outweigh risks from methylmercury. A study by the Harvard Center for Risk Analysis found that if consumers cut seafood consumption by just one-sixth, the risk of developing cardiovascular disease would increase. And the loss of omega-3s during pregnancy would reduce an infant's nutritional benefit by 80 percent.

Further, more recent research shows that selenium protects against methylmercury exposure. Of the 25 foods that contain high levels of selenium, 16 are ocean fish, says the U.S. Department of Agriculture.

Selenium and methylmercury are measured in moles, the number of atoms in a given amount of matter. Most fish on the market contain 5 to 20 moles of selenium for every mole of methylmercury, and one mole of selenium can protect against 75 moles of methylmercury, found the University of North Dakota's Energy and Environmental Research Center.

That is the sort of information consumers need to allay their concerns about eating seafood. The nutritional benefits this lean, PUFA-rich protein offers far outweigh the risks.

Figure 2

Fish High in Omega-3s

(grams per 3.5-ounce serving)

American shad	2.5
Anchovy	1.5
Arctic char	1.6
Dogfish	1.9
Herring	1.6
Atlantic mackerel	2.5
Sablefish	1.6
Atlantic salmon	1.9
Chinook salmon	2.3
Albacore tuna	2.1

Health Benefits Linked to Seafood

Research at such notable institutions as Harvard Medical School, Purdue University, Johns Hopkins University, Brigham & Women's Hospital and universities in Greece, Britain and Australia has produced scientific evidence that seafood is a healthful protein. The omega-3 fatty acids in seafood have been found to:

- Aid infant development
- Reduce childhood asthma
- Lower risk of breast cancer and curb breast cancer growth
- Protect against coronary heart disease, including sudden cardiac death, congestive heart failure, acute coronary syndrome
- Prevent stroke
- Reduce risk of age-related macular degeneration
- Slow progression of Alzheimer's disease
- Halt mental decline
- Reduce depression
- Reduce tissue inflammation and alleviate the symptoms of rheumatoid arthritis
- Improve overall health

Eco-Smart Sourcing

Responsible Buying Takes Commitment, Research and Outside Help

Sustainable seafood is an ethic, a market-trend, an ideal, a movement — and an often-misused buzzword. In its strictest sense, the word means farmed or wild seafood harvested without harm to its population or habitat or to any other species in its ecosystem.

Translating this simple-sounding concept into purchasing decisions is a tall order, especially for big-volume, price-sensitive buyers.

Yet, many large-volume seafood buyers are doing just that, because sustainability makes good business sense on a number of fronts.

Wal-Mart, Ahold USA (owner of Giant, Stop & Shop and Tops grocery chains), Wegmans and Whole Foods Market are among the supermarket companies that have made an effort to adopt sustainable-seafood purchasing policies, as have foodservice companies Darden Restaurants, Legal Sea Foods, Compass Group and Aramark.

These companies understand that protecting fisheries and ecosystems now will aid future productivity, ensuring a consistent seafood supply for restaurant menus and retail cases.

Also driving the sustainability effort is consumers' increasing interest in where their food comes from and whether it is safe for them and for the environment.

Interest in sustainability has been a big-picture trend in the food industry, so much so that "sustainable-local-organic" has been dubbed "the culinary trinity."

Photo courtesy of U.N. Food and Agriculture Organization

Protecting fisheries and ecosystems now will help ensure retailers and restaurateurs a continued seafood supply well into the future.

This trend is not lost on seafood manufacturers, who have watched sales rise for seafood products whose labels make ethical claims.

But overuse of the term *sustainability* sets the stage for "greenwashing," or misrepresenting products as eco-friendly. Consumers are increasingly savvy about "greenwashing," so don't be caught in unintended fraud — and don't fall victim yourself.

Step by Step

Sustainable purchasing is not easy; it takes time to complete an investigation and make a commitment.

In the process, ask many questions of your supplier, farmer or fisherman. Know what you're getting, where it's from and how it was raised or harvested.

When creating a sustainable seafood policy, keep in mind that change doesn't happen overnight. Aramark estimates its shift to sustainable sources of seafood will be a 10-year process.

How best to balance the sustainable-seafood ethic with your business's supply needs is an internal decision. Your company also must decide what goals can be set and achieved by a given timeframe.

You may want to seek help from a third-party source like the Marine Stewardship Council or the New England Aquarium (see the list of third-party options on the following pages).

Sustainability

Third-Party Options

For outside help setting and implementing a sustainable-seafood purchasing policy, look for credible, science-based programs that understand business demands. Here are some to consider:

Environmental Defense Fund
www.edf.org/page.cfm?tagID=1521

The Web site features a seafood list of "eco-best" (mussels, farmed oysters and farmed rainbow trout), "eco-OK" (wild clams, Maine lobster and canned light tuna) and "eco-worst" (shark, orange roughy, bluefin tuna). The user-friendly page also includes information on preparation and health considerations for mercury and PCBs.

FishWise
www.fishwise.org

The flagship project of Sustainable Fishery Advocates, a non-profit organization founded in 2002 to promote sustainable seafood, FishWise applies science and business to help companies improve the sustainability and financial performance of their seafood operations.

Global Aquaculture Alliance's Best Aquaculture Practices
www.gaalliance.org/bapnews.html

The BAP program, introduced in 2003, sets high standards that address food safety, residues, microbial sanitation, HACCP (hazard analysis of critical control points), social responsibility, environmental responsibility and animal welfare.

Marine Stewardship Council
www.MSC.org

Founded in 1997, MSC is a certification and eco-labeling program. A third-party certifier investigates the health of the target wild fishery, the integrity of the ecosystem, the soundness of the fisheries management regime and how well it balances biological, technical, economic, social and commercial aspects. MSC also looks at whether the fishery complies with all local, national and international laws. Among species carrying the MSC eco-label are Alaska pollock and salmon, New Zealand hoki, Oregon pink shrimp and North Pacific halibut.

Ask the Right Questions

The first thing to remember when establishing a sustainable-seafood program is that the source is just as important as the species. Many species come from multiple fisheries, each with individual management regimes in place, or from multiple farming areas, whose practices vary.

For wild fish, it's important to know whether the stock is fished at or below a level that will allow it to replenish itself. In financial-speak: Take only the interest and not the principal that allows the stock's population to remain at a healthy level.

What government body manages the stock? What's its track record? Does the fishing method take only the target species, with minimal "bycatch" or harm to younger, smaller animals of both target and non-target species?

Turtle-excluder devices, for example, serve as trapdoors on shrimp nets to allow sea turtles to escape. These are required for all U.S. shrimp trawlers and foreign fleets selling shrimp to the U.S. market.

With wild fisheries, it is also important to minimize harm to the habitat. The Marine Stewardship Council's certification program can help navigate all of these issues. An estimated 30 percent of the U.S. retail market and 15 percent of the foodservice market buy Marine Stewardship Council-certified seafood.

The sustainability issue is even more muddled when it comes to farmed species. Farmed seafood offers buyers plentiful, year-round availability and diversity, making it an ideal product for many retail cases and menus.

Some non-governmental organizations (NGOs), however, paint a dark picture of aquaculture — particularly farmed salmon — for consumers. But for buyers and consumers who want to be environmentally responsible, avoiding farmed product is no solution.

Sourcing Conundrums

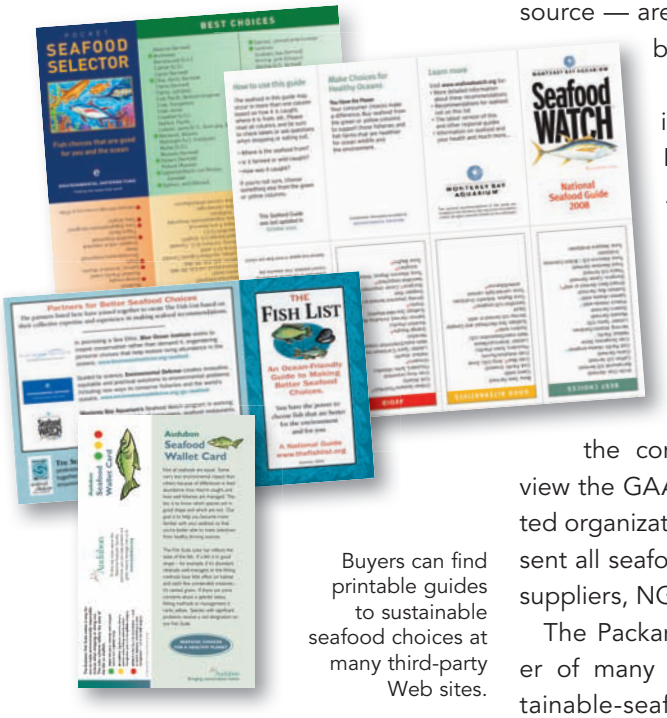
Take, for example, the Monterey Bay Aquarium's advice on catfish, tilapia and farmed salmon. The aquarium's Seafood Watch program offers a rating system that assigns a color — green for "best choice," yellow for a "good alternative" and red for "avoid" — to more than 80 species and sources.

Monterey Bay considers U.S. farmed catfish a best choice and imported basa and swai catfish good alternatives. It rates U.S. farmed tilapia as a best choice, tilapia farmed in Central and South America as a good alternative and Chinese tilapia as a product to avoid. Again, sustainability isn't simple, and input from multiple sources, including your supplier, is essential. When it comes to farmed salmon, Monterey Bay flashes red, regardless of where and how the fish was produced.

One criticism of Monterey Bay's program is that it fails to recognize that practices can vary greatly among farms raising the same species.

Standards are emerging to specify practices and requirements for environmentally responsible farmed fish and organic farmed fish.

The Marine Stewardship Council



Buyers can find printable guides to sustainable seafood choices at many third-party Web sites.

has gained acceptance among conservation groups and large players in the seafood marketplace as the arbiter of sustainability for fisheries. But buyers looking for third-party-sustainability certification for farmed product lack an entity that has credibility with both the aquaculture industry and the conservation community.

For the meantime, the Global Aquaculture Alliance's Best Aquaculture Practices program covers environmental and social responsibility relating to animal welfare, traceability and food safety. The program includes standards for shrimp, catfish and tilapia production and can certify any plant that processes aquacultured species to BAP standards, as well as tilapia farms and hatcheries, shrimp farms and catfish farms.

A product can receive from one to four stars, depending on how many links in the supply chain — hatchery, farm, plant and feed source — are certified as following best practices.

Big seafood buyers, including Wal-Mart, Darden Restaurants, Applebee's and H.E.B. supermarkets, use the GAA's program as assurance of sustainability for farmed shrimp.

But key members of the conservation community view the GAA as an industry-oriented organization that doesn't represent all seafood interests, including suppliers, NGOs and scientists.

The Packard Foundation, financer of many initiatives in the sustainable-seafood movement, has commissioned an environmental management firm to create a business plan for an aquaculture-certification group that would become a farmed-seafood counterpart to the MSC.

The World Wildlife Fund, a co-creator of the MSC, spent about a decade coordinating standards for environmentally responsible aquaculture of shrimp, salmon, mollusks, tilapia, pangasius and abalone through its Aquaculture Dialogs.

Finalized standards will be presented to a certifying entity. When that program is in place, buyers looking for fish farmed to a standard higher than the industry norm will have an additional option.

Until then, they can seek out certified-organic farmed-fish products or ones certified under the GAA's Best Aquaculture Practices program. Buyers also can incorporate other standards into their seafood-purchasing specifications.

New England Aquarium Sustainable Fisheries Advisory Services
www.neaq.org/conservation_and_research/projects/fisheries_bycatch_aquaculture/sustainable_fisheries/index.php

Researchers review what's known about a species, fishery, farm and ecological impacts and assign a sustainability rank based upon environmental impact. They then make detailed purchasing recommendations. Species reports and methodology are peer-reviewed.

Seafood Choices Alliance
www.seafoodchoices.com/home.php

Founded by SeaWeb in 2001, this international network of retailers, restaurants, wholesalers, fishermen, fish farmers and conservationists produces networking events, including the annual Seafood Summit, and sustainable-seafood publications, including an online Smart Choices database. The database covers conservation status, harvest practices and human health considerations for species the alliance considers sustainable.

Seafood Watch
www.mbayaq.org/cr/SeafoodWatch.asp

A program of the Monterey Bay Aquarium. For wild fish, researchers examine whether a species is vulnerable to fishing pressure and whether the harvest method results in bycatch or damages the habitat. For farmed fish, factors like escapement risk and feed contents are weighed. Reports are peer reviewed before species are rated.

World Wildlife Fund Aquaculture Dialogs
www.worldwildlife.org/what/globalmarkets/aquaculture/item5218.html

World Wildlife Fund created dialogs for farmed shrimp, salmon, abalone, tilapia, mollusks and pangasius. Each dialog engages producers, environmentalists and scientists to identify and address fish-farming impacts and establish standards. Fact sheets detail farming practices buyers should consider when sourcing species from a list at the bottom of the main aquaculture dialogue page. Click on the species of interest and scroll down to "Learn More" for a link on "what to look for when buying."

Sustainability

Determining Guidelines

When researching sustainable farmed seafood, some key questions to ask your supplier are: What are the fish fed? Is the species prone to disease? What level of waste ends up in surrounding waters?

Whole Foods undertook its own study and set strict guidelines for its producers of farmed fish, banning use of antibiotics, growth hormones and preservatives; requiring farms to protect habitat; monitoring water quality; providing farm-to-fork traceability; and passing independent, third-party audits.

Wegmans developed a farmed-shrimp policy with the help of the Environmental Defense Fund that prohibits its farmers from using antibiotics or methods damaging to sensitive habitat.

It also requires them to treat wastewater and reduce use of wild fish in shrimp feed. Wegmans also has a similar purchasing policy for farmed king salmon.

The Elusive Organic Label

Seafood buyers seeking some assurance of environmental responsibility for farmed fish can also look to products certified as organic. But organic is not synonymous with sustainable. Organic typically means food grown without the use of synthetic or chemical pesticides, fertilizers or methods.

Sustainability is a broader, more philosophical term encompassing many more factors. In agriculture, for example, organic farmers are required to give their livestock "access" to the outdoors, while sustainable farmers raise their animals on pasture as much as feasibly possible.

Two decades after enactment of the U.S. Department of Agriculture's organic program, there still are no standards for farmed or wild fish.

Seafood products marketed as organic in the United States are generally certified by international bodies but cannot legally carry the USDA organic label, which many marketers believe has greater brand value with consumers.

In California, no seafood can be marketed as organic until it is part of the USDA organic program.

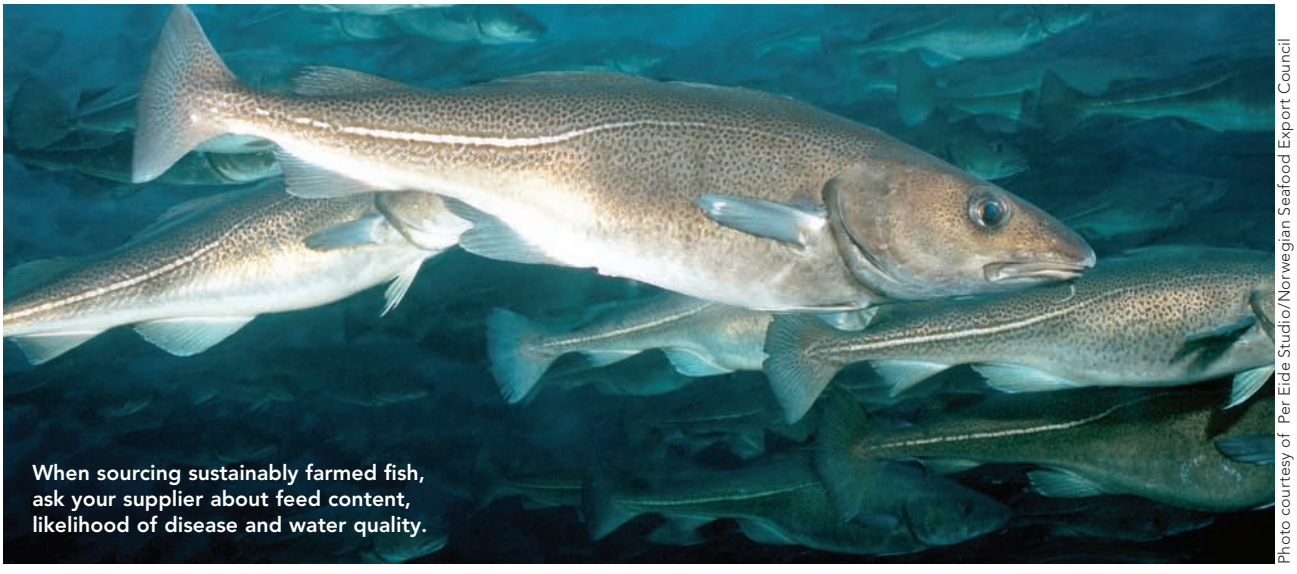
The good news for seafood buyers and marketers is that organic standards for farmed fish are closer than ever to becoming a reality.

The Aquaculture Working Group, a 12-member body appointed by the USDA with representation from industry, scientists and the conservation community, unanimously supports a proposal governing the diet of organic farmed finfish and persistent organic pollutants. If enacted as proposed, the latter measure would yield a USDA-certified-organic farmed salmon with an estimated 90 percent less contamination than conventional farmed salmon.

It also represents a higher standard for contaminants than those currently in place for organic beef and poultry.

For seafood buyers, the sustainability issue over the last several years has been murky. But with so many organizations hard at work to translate that ethic into specific practices that avoid harm to the marine environment, the confusion is clearing.

The next challenge for buyers will be sourcing a seafood supply that consistently reflects the most environmentally sound fishing and aquaculture practices.



When sourcing sustainably farmed fish, ask your supplier about feed content, likelihood of disease and water quality.

Photo courtesy of Per Eide Studio/Norwegian Seafood Export Council

Farming for the Future

Soaring Demand for Seafood Sparks Growth in Aquaculture

Overfishing and habitat destruction have reduced the world's stocks of many species of wild fish, both marine and freshwater. At the same time, global demand for seafood has soared.

To help fill the growing supply gap, seafood buyers are looking to aquaculture operations in the United States and abroad.

In fact, aquaculture is the fastest-growing means of food production worldwide, according to the National Oceanic and Atmospheric Administration (NOAA), and accounts for nearly half of all seafood consumed by humans.

Seafood will become the fastest-growing U.S. protein sector by 2020, predicts industry analyst Howard Johnson of H.M. Johnson & Associates in his report "Seafood Vision 2020." Seafood consumption is projected to increase by nearly 7 percent between 2000 and 2020, versus about 4 percent growth for poultry and declines of more than 3 percent for both beef and pork.

Photo courtesy of Per Eide Studio/Norwegian Seafood Export Council

Different seafood species require different farming methods. At this Norwegian salmon farm, the fish are raised in large net pens.

What Is Aquaculture?

At its most basic, aquaculture is the farming of aquatic organisms from juvenile through adult stage under captive, controlled conditions. Farmed fish are used to rebuild stocks for recreational and commercial fisheries, but the majority of aquaculture production is marketed as food.

Aquaculture encompasses the culturing of marine and freshwater species. Marine aquaculture includes oysters, clams, mussels, cobia, yellowtail and salmon, while freshwater farms raise trout, catfish, shrimp, barramundi and tilapia.

Popular seafood such as salmon and shrimp are both farmed and harvested from the wild. Tilapia, catfish and mussels sold on the market are mainly farmed supplies.

Different species require different farming techniques. Methods for raising fish and shellfish include:

- **Bottom culture:** Species living at the bottom of the sea, such as oysters, are developed through seed spreading and are confined in cages or floats as they mature.
- **Rope culture:** Shellfish, including mussels and clams, are grown on ropes or within mesh bags suspended in the water.
- **Land-based flow-through systems:** Fresh water, diverted from a stream or well, flows through tanks or troughs filled with fish, typically rainbow trout.
- **Net pens:** Mesh enclosures or cages, placed in an offshore coastal site or freshwater lake, are often used for raising salmon and tuna.
- **Pond systems:** Filled with either fresh- or saltwater, natural or man-made onshore enclosures are suited to farming carp, tilapia and catfish.

Table 1

U.S. Trails Behind Other Producers

Top 12 global producers of farmed seafood, by volume (metric tons)

1.	China	32,414,084	**7**.	Japan	746,221
2.	India	2,837,751	**8**.	Chile	698,214
3.	Vietnam	1,437,300	**9**.	Norway	656,636
4.	Indonesia	1,197,109	**10**.	Philippines	557,251
5.	Thailand	1,144,011	**11**.	Burma	474,510
6.	Bangladesh	882,091	**12**.	United States	471,958

Source: FAO (2005)

• **Recirculating, or closed systems:** Most of the water in the tanks is treated and reused. Hybrid striped bass are commonly farmed in such systems, as well as some tilapia.

Johnson predicts that by 2020, four of the top seafood species consumed in the United States — shrimp, salmon, tilapia and catfish — will be produced nearly exclusively via aquaculture.

Other species on the horizon that lend themselves to farmed production include Atlantic cod, barramundi, cobia, halibut, black cod, Southern hake, tuna and yellowtail kingfish. Barramundi has been successfully farmed for more than 15 years, while cobia, halibut and black cod are in the early stages of development.

American Farming Lags

Even though the United States is a huge consumer of seafood, its $1 billion aquaculture industry is still relatively small. According to the United Nation's Food and Agriculture Organization, the United States ranks 12th in world aquaculture production (see Table 1). Currently, more than 80 percent of the seafood Americans consume is imported, and at least half of that is farmed product.

The main factors limiting U.S. aquaculture's expansion are locating suitable sites, establishing regulatory and environmental requirements for existing and new enterprises, developing technologies and best practices that fit with environmental requirements and setting up hatchery operations to supply the farms.

Major criticisms of aquaculture include use of wild fish for feed, antibiotics in farmed fish, the fear of cross contamination with wild stocks, adverse impact on the land, especially from saltwater fish farming, high energy costs and lack of regulation of foreign farmed fish supplies.

On the plus side, aquaculture allows controlled harvesting, giving buyers the benefit of optimum size of a species, and it eases pressure on depleted wild stocks.

Additional U.S. aquaculture can help the nation reduce its $8 billion seafood trade deficit, provide additional jobs and revenue for coastal communities, and meet the growing consumer demand for safe, healthy seafood, asserts NOAA.

At present, most U.S. marine aquaculture products come from shellfish, which are grown onshore or in coastal areas. In a move to eliminate some of the barriers to developing the U.S. aquaculture industry, NOAA's National Offshore Aquaculture Act of 2007 calls for a regulatory framework for open-ocean aquaculture in U.S. waters.

As the aquaculture industry grows and more seafood enters the U.S. market from well-regulated domestic and global operations, buyers will be assured of access to a consistent supply of wholesome, farmed products.

Carp Leads World List...

Top 10 globally farmed species, in millions of metric tons

Carp	19.54
Other finfish	6.32
Oysters	4.62
Clams/cockles	4.18
Tilapia	2.03
Salmon/trout	1.99
Mussels	1.79
Scallops	1.27
Other mollusks	1.25
Other crustaceans	1.06

Source: FAO, 2005 (most recent data available)

...While Catfish Is U.S. King

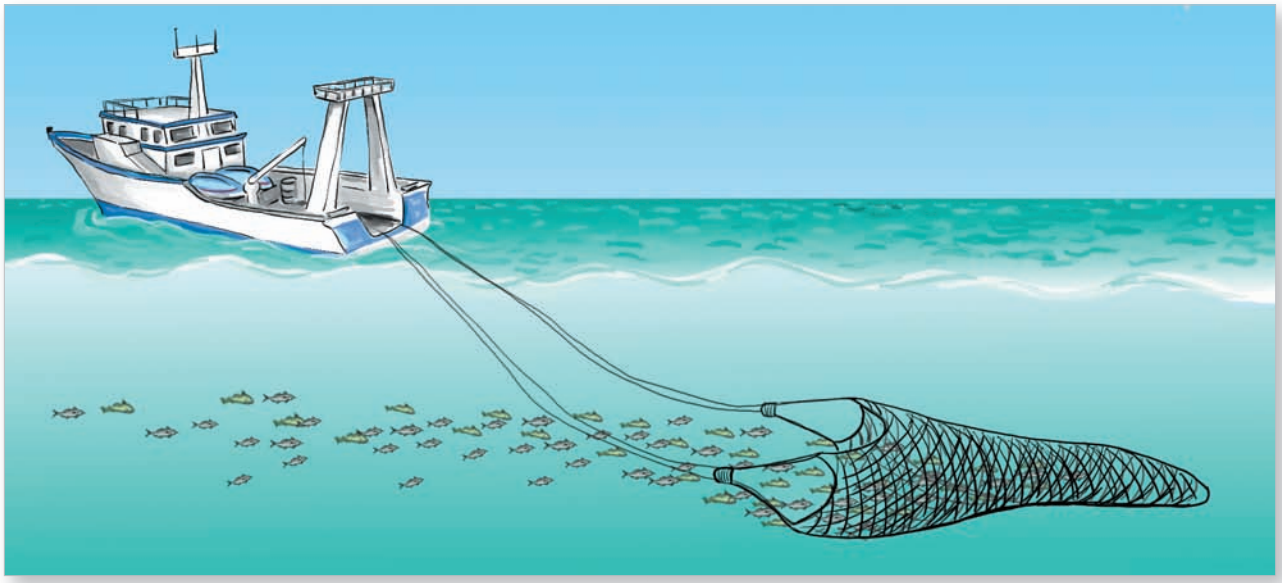
Top 10 farmed domestic species, in metric tons

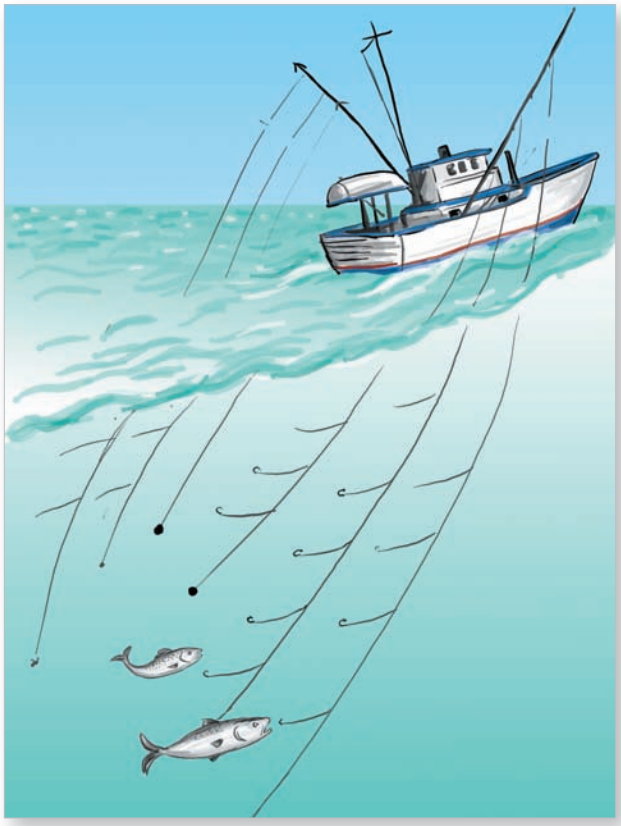
Catfish	275,757
Trout	27,504
Crawfish	16,299
Salmon	9,401
Tilapia	7,803
Oysters	6,219
Clams	5,699
Hybrid striped bass	4,976
Shrimp	3,646
Mussels	436

Source: 2005 Census of Aquaculture, USDA

How Seafood Is Harvested

Many different fishing techniques are employed to harvest the finfish and shellfish that enter the seafood market. Some of these methods target individual fish within a selected species, while others are less discriminating, designed for higher volume and mass production. Each can have an effect on the quality of the end product. Here's a look at eight common harvesting methods — how they work, plus advantages and drawbacks to each.





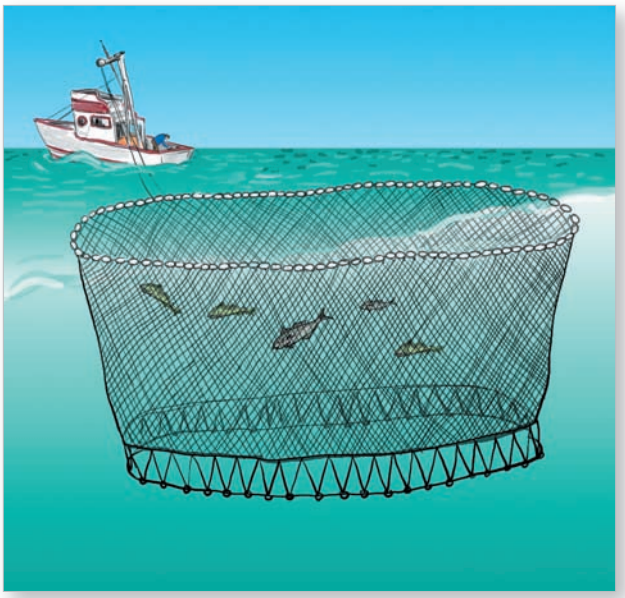
▲ Trawling

A large cone-shaped net, held open by huge plates (called "doors"), is dragged through the water, scooping up everything in its path. The fish end up in the rear section, or cod end, of the net. There are two kinds of trawling: bottom trawling (in which the net is dragged across the bottom) and midwater trawling. Trawling is designed to harvest large volumes of groundfish species like pollock and flounder. Disadvantages include damage to the fish because of the sometimes heavy tonnage hauled up in a single lift of the net and bycatch of non-targeted species or fish of the wrong size.

◀ Trolling

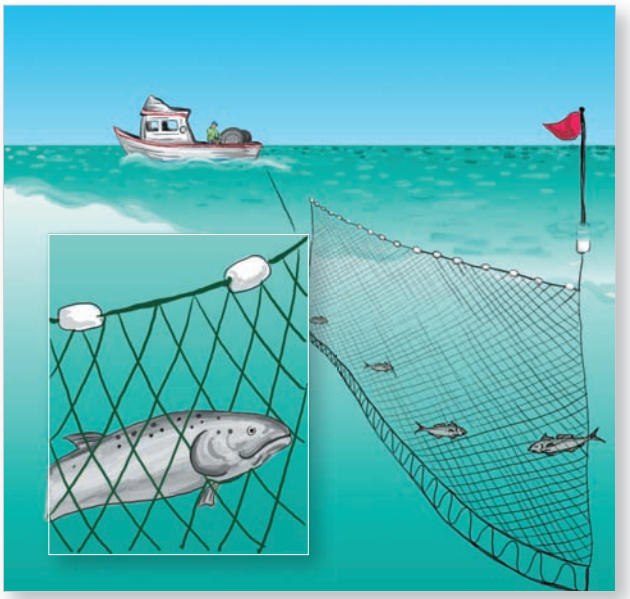
Baits or lures are dragged behind a vessel as it moves through the water. With salmon trolling, as many as six wire lines are lowered from the boat, with "cannonballs" (lead balls) holding each wire perpendicular to the hull. Off each trolling wire, as many as 20 leaders, with bait lures attached, are pulled through the water. The main lines are reeled in and out by hydraulic gurdies (spools). Albacore trolling consists of a dozen or so feathered jigs, each on a single line, skimmed along the surface. The advantage of troll-caught fish is quality. One fish is hooked at a time, cleaned and bled, then stored in ice or frozen onboard.

Harvesting



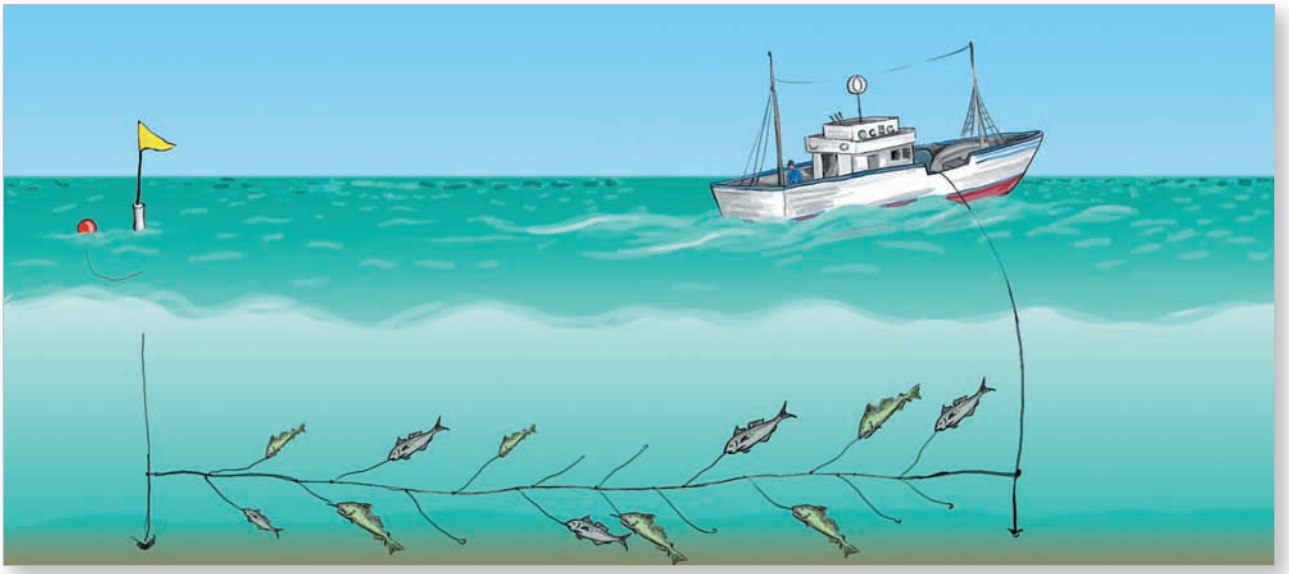
Purse Seining

Schools of fish like herring, mackerel and tuna are encircled with a net, which is then "pursed" at the bottom, trapping the fish. The filled net is hauled back to the vessel through a power block; when it's alongside the vessel, the fish are usually "brailed," or pumped aboard with a suction hose. The quality of seine-caught fish is a function of the volume of the catch.



Gillnetting

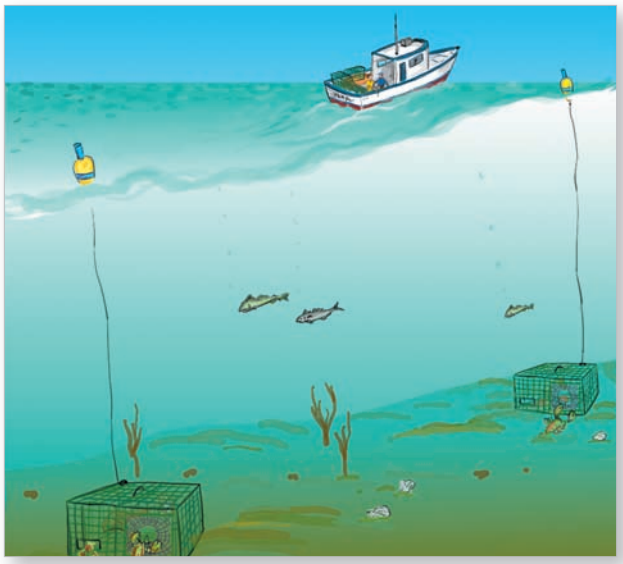
Gillnets entangle target species like salmon and sharks by their gills when they get caught in the invisible mesh. The mesh size determines the size of the fish captured. The advantage of this method is its efficiency; its disadvantage is that it kills on capture, sometimes compromising the quality of the product, and can result in bycatch and "ghost" fishing by lost nets.



Longlining

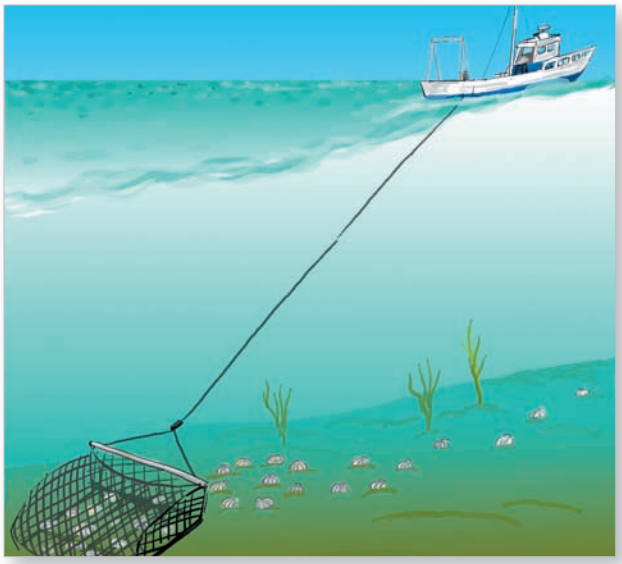
To attract fish, baited hooks are attached to a single longline, which is then set either along the bottom of the ocean or at a depth nearer to the water's surface (depending upon the target species). The ends of the set are marked by buoys and, in the case of bottom longlining, anchored to the bottom. Mahimahi and swordfish are two examples of species that are taken, in part, by surface longlining; halibut and cod are examples of fish species taken by bottom longlining. The advantage of this method of harvest is that fish are brought aboard one at a time, usually while they're still alive, and processed quickly to ensure quality. It's a selective method, reducing bycatch.

Harvesting



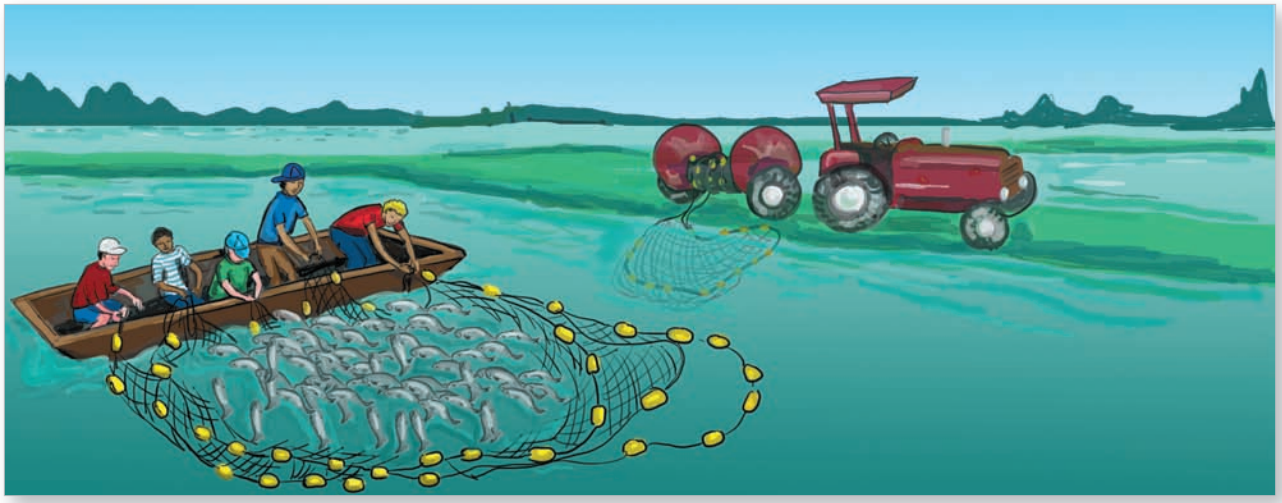
Pot Fishing

Pots, or traps, are fished on the bottom from single lines and buoys, with one pot per line, or from longlines, with several pots to a string and buoys marking either end of the "set." Lobsters and most crab species are captured by single pots. A wire lobster pot may weigh less than 10 pounds, while a king crab trap can weigh 500 pounds. Pot fishing is highly selective, and the product is landed alive for maximum quality.



Dredging

This is a method used for capturing shellfish, primarily scallops, clams, oysters and mussels. A dredge is essentially a metal "rake" that's dragged across the ocean bottom, scraping up shellfish and anything else in its path. The shellfish are collected and held in a chain-mesh bag. Dredges vary from hand-operated to much larger, hydraulically operated versions like those used for harvesting sea scallops and surf clams.



Aquaculture

Aquacultured finfish and shellfish are harvested from a controlled environment in which they have been raised to market size from fingerling or larval stage. For example, salmon are grown in ocean pens, while catfish and tilapia are raised in freshwater ponds or tanks on land. Mollusks like oyster and mussels are grown in systems that suspend them off the ocean bottom. Shrimp are farmed in ponds worldwide. In aquaculture operations, water quality and feed are carefully monitored. Farmed fish and shellfish are usually processed and shipped within hours of harvesting. As such, the quality of product is typically excellent. Aquaculture also offers a consistent, year-round supply and greater price stability than wild seafood.

How Seafood Gets to Market

Several Channels Put Product on Its Way to the End User

A number of middlemen move seafood from harvest to the buyer's outlet, be it a foodservice operation or a retail store. This product flow requires a series of processing, packaging, transporting and marketing functions performed by middlemen who provide customers with a range of services, from manufacturing and distribution to financing. These intermediaries are known as channels of distribution for the trade. Channel functions commonly recognized by the seafood industry and their different functions are listed below.

Primary Processor

Either owns fishing vessels, cultures fish or shellfish or purchases them from others through auction, fishermen's cooperatives, directly or on a contract basis. Primary processors "take title" to seafood, meaning that they own the product until it is received by the buyer. The primary processor handles the seafood in some way, either by repacking, as with shellfish, or by cutting finfish into various product forms and packing to customers' specifications. Primary processors sell products either through in-house sales staff or through brokers. Processors arrange for transportation to the buyer's destination, and many extend credit for the purchase.

Secondary Processor

Purchases fillets or blocks and prepares them in some way for sale as ready-to-cook items, like breaded and battered portions, chowders, frozen entrées or other prepared products. Companies involved in secondary processing (also known as "converters") usually generate large-volume sales, which are made by in-house staff or brokers.

Wholesaler/Distributor

Often interchangeable terms, as many wholesalers distribute. They generally purchase large amounts of processed seafood from primary processors and sell them in smaller amounts to a number of customers. Primary processors can be wholesaler/distributors. Wholesalers may carry a wide variety of products and product forms. They take responsibility for quality control and often provide marketing support, such as point-of-sale materials and promotional pricing.

Trader/Broker

Sources and sells large volumes of commodity seafood, usually by the container load. Quantity and high volume are the traders' keys. They may or may not take title to the products they sell, but they rarely take physical possession. Brokers sell seafood as independent representatives of a number of products processed or manufactured by others. Quantity is not so important, and a large brokerage may handle a variety of products other than seafood. Brokers almost never take title to the products they sell and are compensated by commissions on sales.

Importer

Processors, wholesalers, traders or brokers may all be importers. These middlemen source seafood products outside the United States and make arrangements for shipment of these product to U.S. buyers. Arrangements for which they take responsibility include all import regulations and duties. Since a large percentage of the seafood consumed in the United States is imported, many intermediaries perform this function.

Exporter

Exporters sell products that have been processed or manufactured in the United States to buyers outside the country. Any of the intermediaries may be involved in exporting.

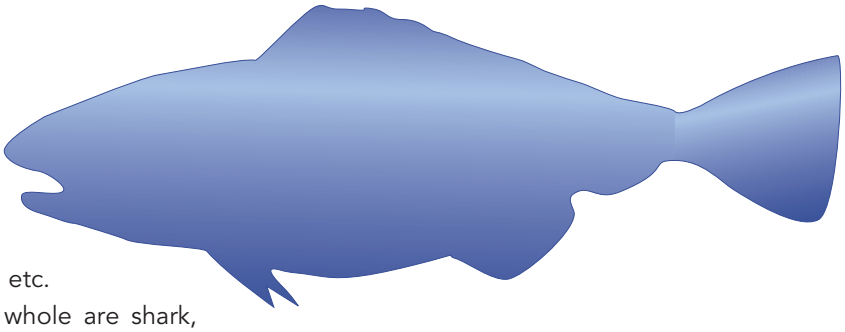
■ Ultimately, a buyer's decision about which of the above intermediaries to use should be based on an analysis of which channel functions he needs to have performed.

The Infinite Variety of Seafood

Seafood offers more choices than any other protein. There is an infinite variety of species of fish and shellfish from around the globe, each available in many different product forms. That gives seafood buyers a lot to think about when making purchasing decisions. How do you know which products to carry? And how can you effectively pitch them to your customers? This section of the *Seafood Handbook* is a primer on major product forms for finfish, surimi seafood, crab, shrimp and value-added seafood. It also explains the smoking and freezing processes to help you better understand those product options.

Finfish

WHOLE FISH: The Key to Quality



DEFINITION: "Round fish" or fish "in the round," with head, viscera, tail, etc. still intact. Among many fish offered whole are shark, tuna, swordfish, salmon, tilapia, red snapper, trout, mackerel, striped bass, ocean perch and black sea bass.

Advantages

Cost. Whole fish is normally the least expensive form of seafood, if it can be carefully processed and fully utilized — as fillets, steaks, loins, even soup stock. (A word of advice: Learn species-specific yields for the various cuts from whole fish before you make your purchase, or you may wind up paying more than you expected for an "inexpensive" product. Suppliers should be able to provide you with information on yields.)

Quality. A whole fish affords an unequaled opportunity to assess the quality of the product, since key indicators — eyes, gills and scales — are still present.

Disadvantages

Deterioration. Head, gills and viscera provide a source of bacterial and enzymatic contamination, so process whole fish quickly. Fatty fish like salmon and mackerel are especially susceptible to rancidity if not stored properly or processed promptly.

Expense. Processing whole fish can be expensive, unless you have uses or markets for every part of the fish.

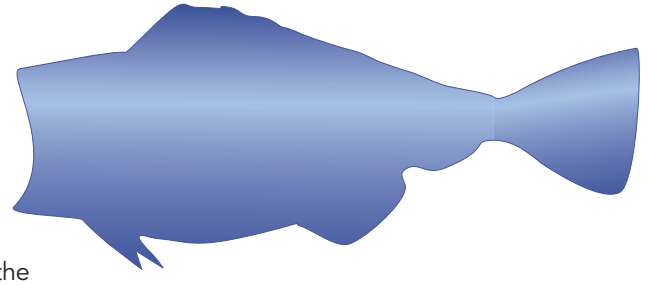
Waste. Disposing of unused or unwanted parts can present problems.

Checklist

- ☑ Fish should have a bright, shiny appearance and little or no aroma. Dull-colored skin suggests deterioration.
- ☑ Eyes should be bright and full, with black pupils and clear corneas. Clouded, sunken gray or pinkish eyes can indicate a lack of freshness.
- ☑ Scales should be firmly attached, and gills should be red and free of slime, an indication that oxygen is present and that the fish is very fresh.
- ☑ Flesh should be firm and elastic to the touch. Check belly for swelling and gas; deterioration there will rapidly spread to the flesh.

Product Forms

H&G: An Economical Option



DEFINITION: Fish with heads and guts (viscera) removed, unlike "dressed" fish, which are typically sold head-on and gutted and with gills in or out. Though H&G fish provide several processing options, they are normally steaked crosswise to the backbone. Salmon, halibut, mahimahi, Chilean sea bass and tuna are among species typically offered this way.

Advantages

Shelf life. H&G allows maximum options and utilization of the net product without sources of contamination like the gills and guts.

Savings. Shipping costs for H&G fish are less than for whole fish. Labor costs associated with heading and gutting are also eliminated, as is the cost of disposing of unused parts of the fish.

Disadvantages

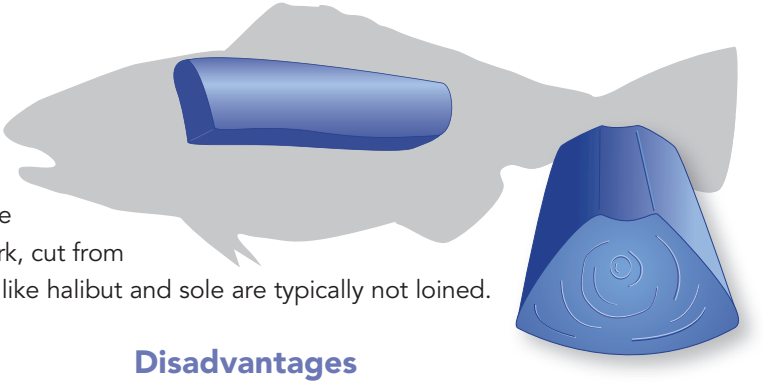
Expense. Because it has been processed, H&G is more expensive than whole fish.

Labor. H&G fish, unless cooked in that form, normally require some further processing.

Checklist

- ☑ Like whole fish, H&G products should have a bright, shiny appearance and no "off" odors. Dull-colored skin suggests deterioration.
- ☑ Scales should be firmly attached. A few missing scales may or may not mean bad quality (some species' scales detach more easily than others) but will detract from appearance.
- ☑ Belly should be free of all viscera or traces of blood, which will spoil the meat.
- ☑ Belly walls should exhibit elasticity. To test, stretch them a bit and see if they retain their shape.

LOIN: The Prime Cut



Definition: A cut, normally of uniform thickness, with no taper and no bones. Loins are taken from large fish like tuna, swordfish or shark, cut from the backbone lengthwise into quarters. Flatfish like halibut and sole are typically not loined.

Advantages

Top quality. The loin is the highest-quality cut, offering the thickest, densest meat without the waste of skin or bones.

Versatility. Individual loins can be sold whole, cut into large pieces ("chunks," "slabs," "bullets" or "sides") or sliced into individual, uniform steaks.

Custom cuts. Some suppliers offer loins from specific parts of large fish, or certain parts ("links") of a large loin, like a center-section, which has the best taste and most uniform texture. Choice loins in large fish like tuna or swordfish are cut to avoid two "bloodlines" of darker, stronger-tasting meat that run parallel to the backbone.

Disadvantages

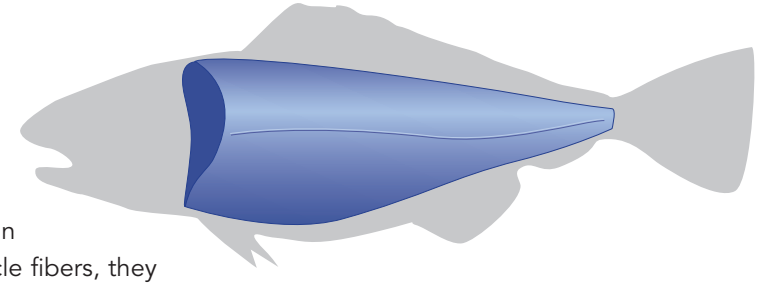
Expense. Loins are among the most expensive cuts available. They often require further cutting and trimming into steaks before sale, which can result in unanticipated waste.

Shelf life. Careful handling is critical, since the exposed, skinless meat dehydrates easily.

Checklist

- ☑ "Natural" fillet loins of small or medium-size fish should be approximately the same size and configuration, with little tapering and no thin spots. "Cut loins," taken from a longer strip down the back of the fish, may be thinner on one end.

FILLET: Mainstay of the Case and Menu



DEFINITION: Sides of a fish that have been cut away from the backbone and removed in one piece. Cut parallel to the spine and muscle fibers, they run "with the grain." Round fish like cod offer two fillets. Flatfish like flounder, halibut or sole offer four, two from the top side, two from the bottom. Fillets cut from a large flatfish and then further divided into boneless portions — often half of each fillet, or one-eighth of the entire fish — are called fletches.

Fillets vary in length and thickness, depending on the size and species of fish from which they are taken. Fillets also vary greatly in color, depending on the species. Cod or haddock fillets, for example, are white. Bluefish can be grayish. Salmon fillets range from pink to a deep, rich orange.

Advantages

Convenience. Bones are nearly or completely removed, so fillets require little further processing.

Versatility. Fillets absorb sauces well and can be fried, baked, broiled, sautéed or poached.

Good portion control. Fillets can be sized for appropriate plate coverage.

Disadvantages

Shorter shelf life. Shelf life averages three to five days with fresh fillets, since the product is relatively thin but has a large surface area that can readily admit bacteria or dehydrate quickly.

Easily overcooked. Extra care must be taken when cooking fillets, especially thin fillets of lean-meated fish species.

Checklist

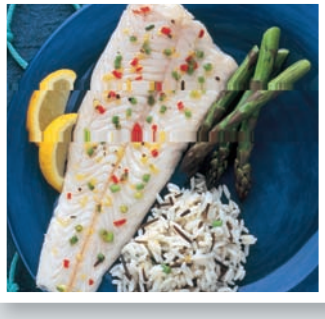
- ☑ Fillets should be well trimmed, neatly cut and exhibit no blood indicating that the fish was gaffed, bruised or otherwise mishandled.
- ☑ Skinned fillets should show no traces of skin attached.
- ☑ High-quality fillets have shiny, smooth surfaces. Poor-quality fillets exhibit curling at the edges, and the meat may be yellowish and gaping broadly in spots.
- ☑ Dullness and a gray or brownish color can be a sign of oxidized, aging product.

Fishery Products International

THIN FILLETS

Small flatfish like sole or flounder; elongated or small roundfish

- Cook very quickly
- Benefit from moist cooking
- Best with simple treatments



Alba Specialty Seafood Company

MEDIUM FILLETS

Mid-sized groundfish species like haddock, pollock, cod

- Cook fairly quickly
- Respond well to steaming, baking, braising and frying
- Good with lively sauces or coated with breadcrumbs

Alaska Seafood Marketing Institute

THICK FILLETS

Big flatfish like Alaska halibut or roundfish like salmon

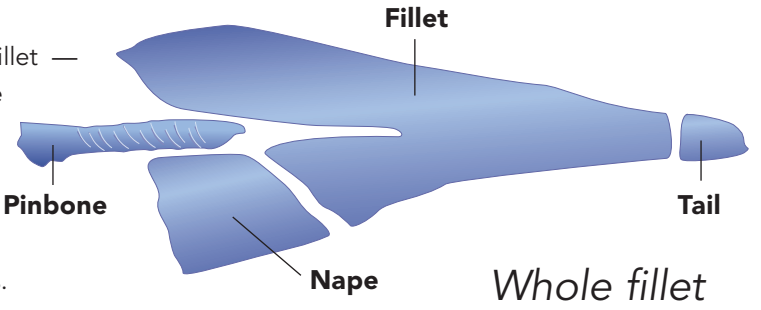
- Firm and meaty
- Adaptable to a variety of cooking styles
- Can take bold sauces

Product Forms

Types of Fillets

WHOLE FILLET

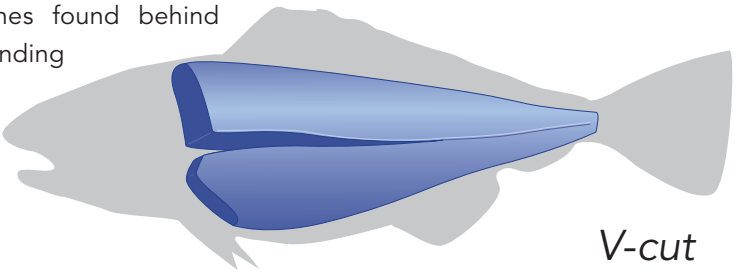
Not common in the U.S. market, a whole fillet — skin-on or skinless, including pinbones, nape and belly flap — offers buyers a lower-cost option than V-cut or J-cut fillets. It can also be trimmed to meet individual needs — a boon for foodservice operators who use trimmings for soup stocks or as flavor additives.



Whole fillet

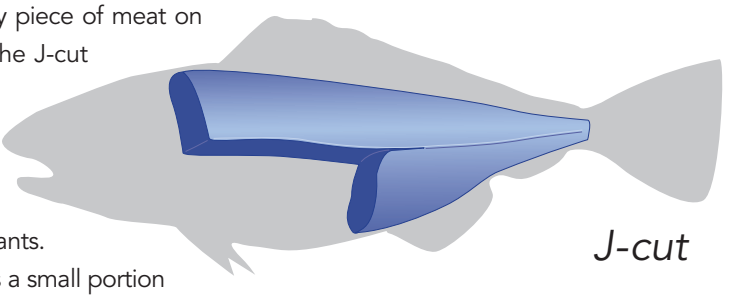
V-CUT

Removes the pinbone (a set of small bones found behind the ribs), along with a strip of flesh extending one-third of the fillet's length along its lateral line, from the thickest front portion of the meat toward the tail. Boneless V-cut fillets decrease risk to consumers and eliminate the need for any further deboning.


V-cut

J-CUT

Removes the pinbone and nape, a small, thin, fatty piece of meat on the lower side of the fillet, forward of the belly. The J-cut may also remove the thin belly meat just behind the nape. Premium, J-cut fillets are often the most expensive and usually offer slightly less yield than V-cut fillets. Some processors offer a "Boston cut," which is often preferred by upscale restaurants. This cut removes 90 percent of the nape and leaves a small portion of the tiny pinbones, which break down when cooked and become indistinguishable from the rest of the fillet.


J-cut

Additional Options

SKIN-ON/SKIN-OFF

Skin-on fillets allow buyers to identify species, thus avoiding potential product substitution. Most "mainstay" finfish, such as cod and flounder, are sold skin-off. Fish with soft flesh that gapes readily (such as bluefish) are rarely skinned because the fillets then tend to fall apart.

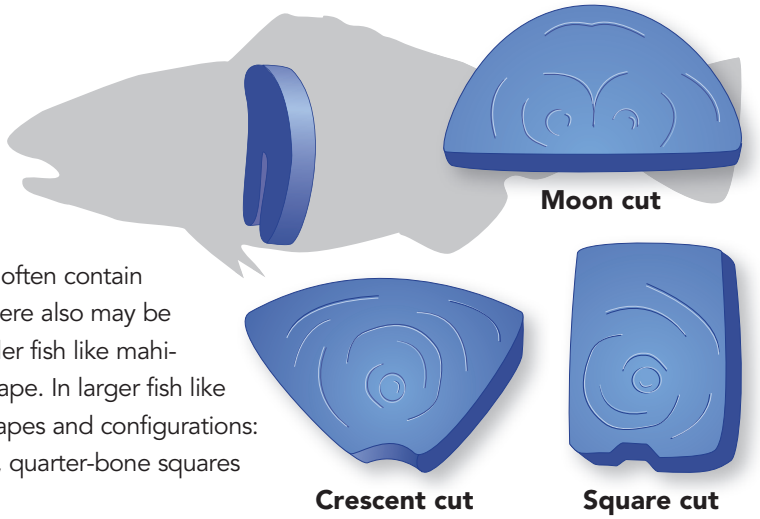
DEEP-SKINNED

Skinning to a level that removes the subcutaneous fat layer between the skin and muscle tissue. The fat layer is the source of much of a fish's oil and pronounced flavor.

TAIL-ON/TAIL-OFF

Tail-on fillets offer higher yield and lower cost. A disadvantage is that fillet meat is thinner near the tail and can be easily overcooked. In addition, the tail may curl and darken during cooking, offering a less appealing appearance on the plate. Tail-off fillets are offered with tail either fully removed or "cropped," a process by which the tail is cut off in squared fashion, lending a more geometric appearance to the meat.

STEAK: The Meat Eater's Alternative



DEFINITION: Cross-sectional slices of fish, cut perpendicular to the backbone, normally 1 to 2 inches thick. With some fish, like salmon, steaks often contain a thin band of skin and a piece of backbone. There also may be some pinbones and pieces of belly flap. In smaller fish like mahi-mahi or catfish, bone-in steaks are uniform in shape. In larger fish like halibut, tuna or shark, steaks come in several shapes and configurations: ovals, squared ovals, sandwich cuts, half-moons, quarter-bone squares and wedges.

Advantages

Full utilization. Boneless, skinless steaks cut from the loins of large fish have no waste.

Economy. Cross-sectional steaks are generally less expensive than fillets or loins.

Portion pricing. Steaks can be priced by the piece, reducing the "sticker shock" of seafood sold by the pound.

Custom cuts. Though most portion-controlled steaks average 4 to 10 ounces apiece, suppliers can provide additional definitions and specifications to meet customers' needs.

Customer appeal. Steak is an easy sell to consumers who usually prefer meat.

Disadvantages

Shelf life. Mostly or entirely skinless and cut across the grain, steaks are vulnerable to dehydration and, thus, limited shelf life.

Bone-in cuts. Cross-sectional steaks are often less. popular at the foodservice level, owing to the inclusion of bones.

Checklist

- ☑ Steak should be moist, firm and elastic, with a fresh-cut appearance.
- ☑ Look for traces of browning, drying or curling around the edges, a sign of deterioration or over-extended shelf-life.
- ☑ Look for uniformity of thickness and size. Too much variation will make cooking times uneven.

LIVE: Fresher Than Fresh

DEFINITION: Breathing, swimming fish, plucked from their watery environment and processed on demand for the customer — the ideal option for those who want the cachet of live product and total control over all product forms. Typical finfish species sold live include tilapia, catfish, trout, hybrid striped bass and rockfish.

Advantages

Merchandising. Live tanks are attention-getters.

Customer service. Live fish are ready for any form of processing or cooking the buyer desires.

Premium price. Customers are willing to pay extra for "the freshest fish there is."

Disadvantage

Live seafood can be costly to procure, transport and maintain in holding tanks. And a sick live fish is of lower quality (and value) than a properly frozen dead one.

Checklist

- ☑ Buy or construct holding systems appropriate for the species.
- ☑ Pay close attention to temperature, salinity, oxygen level, pH and stocking-density levels — or hire a tank-maintenance service.
- ☑ Do not mix species unless you are certain they are compatible with each other and their environment. Source-point suppliers are experts in these areas.

Surimi Seafood: User-Friendly Analogs

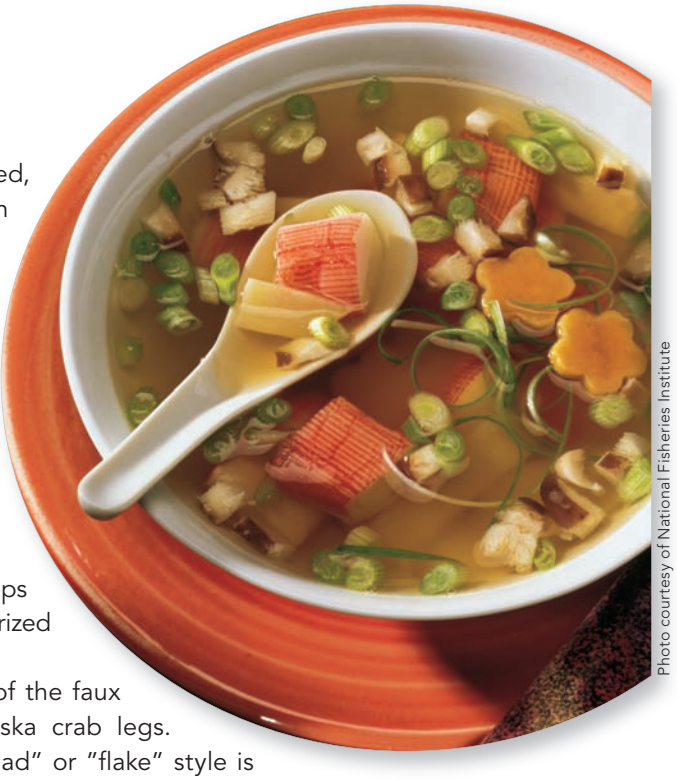


Photo courtesy of National Fisheries Institute

Surimi seafood is simulated shellfish made from cooked, mild-flavored, lean, white-fleshed fish — most often Alaska pollock and hake/whiting. To create surimi, the raw base from which analog products are made, the fish is deboned, minced, rinsed and rendered into an odorless, white paste to which starches, red coloring, natural and/or artificial flavorings, binders and stabilizers are added.

This paste is kneaded and braided to the desired texture and form and then cooked. High-end surimi seafood products include a percentage of natural shellfish meat, and some add omega-3s and calcium.

Surimi seafood mimics crab, lobster, shrimp, scallops and even lox. Many of these analog products are pasteurized for extended refrigerated shelf life.

Crab-flavored surimi seafood is the most popular of the faux shellfish. Five-inch-long "whole legs" resemble Alaska crab legs. Bite-sized "mini cuts" imitate king or snow crab. "Salad" or "flake" style is small chunks and shredded pieces resembling picked crabmeat. Chunks of 3/4 inch to 2 inches can be bias-cut, straight cut or a combination of the two.

How Surimi Seafood Is Sold

- Crab legs or chunks
- Shredded, flaked crabmeat
- Lobster tails
- Peeled shrimp
- Whole scallops
- Smoked salmon
- Bulk seafood salads
- Seafood spreads and dips
- Prepared dishes

For recipes calling for crabmeat, lobster or shrimp, versatile surimi seafood can be an affordable and convenient stand-in. Because it's already cooked, it can be used cold for salads or added to casseroles and soups in the last minutes of cooking.

Because of surimi seafood's similarity to shellfish products, for years the U.S. Food and Drug Administration required labels to state "imitation crabmeat." It now allows suppliers to describe the product as "crab-flavored seafood made with surimi, a fully cooked fish protein." "Lobster," "scallops," "shrimp" and other seafood can be substituted for crab.

Quality Issues

Not all surimi seafood is created equally, and the quality of cheaper, imported supplies can be especially inconsistent. Low-grade surimi is made from lesser-quality fish species and features a higher ratio of additives and water to fish.

This results in a mushy texture and poor flavor. High-grade surimi is a clean, white, pollock-based product textured and flavored to resemble the species it imitates.

Checklist

- ☑ Surimi seafood should be firm, but not too firm, which could mean too much starch was added.
- ☑ Red surface coloring shouldn't bleed into the white portion.
- ☑ Discoloration and a sour or fermented odor indicate spoilage.
- ☑ Degree of sweetness or saltiness varies by brand.
- ☑ Surimi seafood can contain allergens like MSG, egg and shellfish.

Crab: Parts or Whole

Alaska, Pacific Northwest Crab

Photo courtesy of Alaska Seafood Marketing Institute

Dungeness crab cocktail claws.

The Pacific Northwest's commercial crab species — king, snow and Dungeness — are typically sold cooked and frozen. The primary processed forms are:

Whole-cooks: Industry shorthand for whole, cooked crabs, available fresh but more often brine frozen. A market form more prevalent for Dungeness than king or snow.

Cluster: A group of legs and a claw from one side of a crab, with the connecting shoulder area still attached but gills, viscera and back shell removed.

Clusters are also known as sections; the terms are used interchangeably, but cluster more often refers to snow crab, while section is associated with king and Dungeness crab. King crab sections consist of three walking legs and one claw arm; snow and Dungeness have four walking legs and a claw arm. Clusters are sold cooked and frozen.

Legs: Single, whole walking legs, frozen and sold intact or as splits (halved lengthwise to expose meat) or snap-'n-eats (prescored for easy hand cracking of the shell to extract meat). All three crabs come as whole and scored legs; king and snow legs are sold as splits.

Claws: Individual claws available in a number of forms, including cocktail claws (shell removed above the pincer), cap-on claws and broiler claws (cap-on but scored for easy removal).

Meat: Extracted from body, legs and claws. The choicest is merus, the large piece of white meat at the top of the leg.

Checklist

- ☑ Whole cooks should not have cracked backs, and all legs should be present.
- ☑ Discoloration in shoulder end of clusters can indicate undercooking. Yellowing suggests freezer burn.
- ☑ Leg-and-claw packs should be of accurate proportion (i.e., three legs for each claw with king crab).
- ☑ Splits should exhibit clean and even cuts.
- ☑ All frozen crab products should be well glazed.

Snow crab splits.

Photo courtesy of Alaska Seafood Marketing Institute

Product Forms

Blue Crab

Blue crabs are harvested as hardshells, peeler crabs (just before molting) and softshells (right after molting). Hardshell males, called jimmies, are commonly sold live to be cooked and eaten whole. The smaller females, called sooks, are more often sold to processors for picking, and the meat is sold fresh, frozen or pasteurized. Hardshells are sold in three sizes: jumbo, large and medium. Softshell blue crabs are available live, fresh or frozen and are subject to a more complex grading system, detailed below.

Whole Softshell Crabs

Common grades, measured across the carapace, are:

Mediums	3 ½–4 inches
Hotels	4–4½ inches
Primes	4 ½–5 inches
Jumbos	5–5 ½ inches
Whales	over 5 ½ inches

Meat: Most processed blue crab is marketed as picked meat, in three basic grades:

Jumbo or jumbo lump: The largest unbroken pieces of white meat from the body, connected to the swimming legs.

Lump, backfin or special: White body meat, containing smaller and broken pieces of lump and flake meat.

Claw and claw fingers: The darker meat from the claw.

Blue crabs can be cooked and eaten whole or picked for meat.

Checklist

- ☑ Live crabs should show some leg movement when handled; don't buy or cook dead crabs.
- ☑ Look for heavy crabs; they're near the end of their molting cycle and contain more meat.
- ☑ Avoid crabmeat that has an ammonia odor.

Crabmeat Grades

The five basic commercial crabmeat grades on the market

Claw Meat

Claw Fingers

Jumbo Lump

Special

Backfin

Shrimp: An Option for Every Application

Not only are there many varieties of shrimp worldwide, but there is a great diversity in product forms. Product can be divided into two basic types: raw and cooked. It can then be further divided into fresh and frozen. Within these broad categories, almost all shrimp in the U.S. market is sold as tails, and the bulk of that is sold frozen. Primary product forms for frozen shrimp are:

Green headless. The standard market form. Includes the six tail segments, with vein, shell and tail fin. "Green" does not refer to shell color but to the uncooked, raw state of the shrimp. Also called "shell-on" or "headless."

Peeled. Green headless shrimp without the shell.

PUD. Peeled, undeveined, tail fin on or off; raw or cooked. The vein, running the length of the tail, is the intestine, also called the sand vein.

Tail-on, round. Undeveined shrimp with tail fin on.

P&D. Peeled, deveined, tail fin on or off; raw or cooked. Another name for IQF P&D shrimp is PDI (peeled, deveined, individually frozen).

Cleaned. Shrimp that is peeled and washed, a process that removes some or all of the vein but is not thorough enough to warrant the P&D label.

Shell-on cooked. Cooked tail, with vein, shell and tail fin.

Split, butterfly, fantail. Tail-on shrimp that are cut deeply when being deveined.

Pieces. Shrimp with fewer than four or five whole segments, for small shrimp and large shrimp, respectively (all shrimp have six segments). Often graded as small, medium and large, though no standards exist.

Frozen Shrimp Packs

Blocks: Typically, green headless shrimp. Blocks offer easy storage and the versatility afforded by a basic raw product. But separating out a portion of the block can be a challenge, and labor is required to peel and devein the shrimp. Shrimp blocks come in one of two styles:

- **Layerpack.** (Also "finger pack.") Meticulously hand-packed shrimp, frozen in a neat pattern and double-glazed.
- **Random.** (Also "jumble" or "shovel" pack.) These may have some order, but shrimp are not evenly glazed.

IQF: Individually quick-frozen, most common with PUD and P&D shrimp. IQF packs may be less convenient than blocks to store, but they offer savings in labor and allow the user to remove the quantity needed and return the

Breaded Shrimp

Shrimp, tail-on or tail-off, is the most commonly breaded shellfish on the market. Shrimp can be breaded by hand or by machine. Breaded shrimp is usually processed raw and sold frozen in the following forms:

Round or whole. Head-off and deveined, with tail on or off.

Butterfly or "fantail." P&D, cut deeply along the upper side, then laid flat with the two halves side by side but with two sections still joined.

Split ("Western" style). Shrimp cut all the way through into two separate halves, attached only at the tail fin.

Mini-rounds or "basket shrimp." Small (40 to 70, breaded, per pound) shrimp, usually undeveined, sometimes tail-on.

The Shrimp Count

Descriptive Size Name	Green Headless	Peeled	Cooked
Extra colossal	Under 10	Under 15	16/20
Colossal	Under 15	16/20	21/25
Extra jumbo	16/20	21/25	26/30
Jumbo	21/25	26/30	31/35
Extra large	26/30	31/35	36/40
Large	31/40	36/45	41/50
Medium large	36/40	41/45	46/50
Medium	41/50	46/55	51/60
Small	51/60	56/65	61/70
Extra small	61/70	66/75	71/80
Tiny	Over 70		

Because shrimp are so small, they are sold by a count (number) per pound rather than by individual weight. This is expressed as a range. For example, a 16/20 count means shrimp of such a size that it would take from 16 to 20 of them to make up a pound. The smaller the count, the larger the shrimp. To give you an idea of the size range for warmwater shrimp, depicted here as shadows of full-scale green headless shrimp are three sizes: Extra colossal (the biggest), Large (the mid-size) and Tiny.

As a rule, shrimp lose one size count when peeled, another when cooked. Consistency of size within a specific count range is important, as mixed sizes affect both count and appearance. To determine the uniformity ratio (UR) of a pack, visually select and weigh not more than 10 percent (by number) of the largest and 10 percent of the smallest shrimp. Calculate UR by dividing the total weight of the largest by the total weight of the smallest. The lower the ratio, the more uniform the count. If all shrimp are the same size, UR will be 1.0.

Layerpacked shrimp

unused portion to the freezer.

Glaze is necessary to properly freeze shrimp. Both shrimp blocks and IQF shrimp are glazed with a protective ice coating to prevent dehydration.

Blocks are packed in polyethylene wraps inside cartons, which are then filled with water inside the polyethylene film, so the block is completely encased in water before it is frozen.

IQF shrimp is first frozen, then passed through a drip or spray of water to coat each piece, then re-frozen. This may be done several times to build up sufficient protection.

Checklist

- ☑ Shrimp should be of uniform color, size and condition. Mixed colors could indicate mixed species or decomposed product.
- ☑ Shrimp should smell like fresh seaweed or seawater. Hydrogen sulfide (rotten egg) or ammonia smells indicate decomposition.
- ☑ Melanosis, or black spot, is natural deterioration of shell and meat but indicates poor quality.
- ☑ A shrimp with fewer than five whole tail segments should be graded as a piece.
- ☑ Check breaded shrimp for "halos," fringes of excess batter and breading; breading lumps; or voids in the coating.
- ☑ There should be no extraneous material, like flippers, antennae, shell fragments or legs.
- ☑ Grade A shrimp has "good flavor and odor." Grade B has "reasonably good flavor and odor." Grade C has "minimum acceptable flavor and odor with moderate storage-induced flavor or odor."

Value-Added: Variety and Savings

DEFINITION: Products that have been modified by cut, shape, coating, preparation or packaging to improve handling, presentation, profitability and convenience. Value-added products include marinated, breaded and/or battered portions; sauced or pre-cooked entrées; and appetizers or snacks that are ready to steam, sauté, bake, fry or microwave.

Examples of value-added seafoods range from breaded shrimp or fish sticks to seafood burgers and frozen seafood-and-pasta dinners.

Advantages

Variety and flexibility. Value-added seafoods offer purveyors a way to expand the variety of their products and build flexibility into inventories or menus.

Labor savings. Value-added seafoods save labor costs and reduce safety hazards associated with processing, packaging or handling products.

Disadvantage

Value-added products are only as good as the raw finfish or shellfish from which they were made. Check the source of the fish or shellfish and find out how it was processed before you buy.

Or, better yet, cook a sample, then smell it and taste it for yourself.

Convenience is the hallmark of value-added products. What could be easier for a snack or main course than ready-to-cook, breaded clam strips?

Battered and Breaded

These are the most abundant and popular value-added seafood products. The highest-quality breaded products are natural, hand-cut fillets, though many are cut from pre-formed, frozen fish blocks using band saws; others are cut from natural fillets using water jets.

Fish fillets or portions and shrimp are the most typical breaded seafoods.

Shrimp, tail-on or tail-off, is the most commonly breaded shellfish product. Breaded pieces of broken shrimp are also available.

Sometimes marinated before they are coated, breaded shrimp are usually processed raw and sold frozen. Breading is accomplished either by hand or machine.

Other breaded shellfish include mussels, oysters, scallops and clams, the latter often available as breaded strips. And breaded squid is offered as tubes, tentacles, rings, strips and mantles.

Shrimp is the most commonly breaded shellfish product. Breaded, tail-on shrimp like these are popular for appetizers or entrées.

Product Forms

Checklist

- ☑ Breaded products should have a clean, uniform appearance, and individual pieces should separate easily.
- ☑ Breading should be intact, with few voids.
- ☑ Avoid over-breaded seafood. You'll be paying more for lower quality and less flavor. (By law, breaded seafood that is less than 50 percent raw product must be labeled "imitation," and "lightly breaded shrimp" must be 65 percent shrimp. Some lightly breaded products are as little as 15 percent breading.)
- ☑ Because breaded or battered products cannot be glazed, they are susceptible to freezer burn. Complete coating and good packaging are important for these products.
- ☑ Frost on breaded products is often a sign that temperatures have fluctuated during storage or transportation. This is a safety problem for products that will be fried, since frost turns to steam in hot fat or oil and spatters.

A word of caution: Do not thaw breaded and battered products. They must remain frozen until they are cooked.

Breaded Seafood Categories

Raw breaded. Battered, breaded seafood typically frozen for later cooking. The wet, adhesive batter normally consists of 80 to 90 percent corn, rice, soy, wheat or barley flour, plus dry milk, eggs, seasoning and water. The dry, crunchy breading can vary from a crumb-style "American" coating to a lighter "Japanese" coating to "garlic and herb," "Cajun style," "hot 'n spicy" or a "Kentucky style" that mimics the breading on popular fast-food chicken items.

Battered fillets are a labor-saving base for fish and chips, both on the menu and in the frozen case at retail.

Oven-ready. Battered, breaded, then re-battered seafood fried briefly at a high temperature, often in canola oil or olive oil, which are high in unsaturated fats. Popular at family diners, fast-food restaurants and grocery stores, these products can be fried or baked in a conventional oven.

Garlic, onion, paprika or other herbs or spices are often added for flavor and color. Starch is sometimes added to enhance adherence of the batter to the raw product. Leavening agents like baking soda make the batter fluffy and give it a better "bite," and milk powders and sugar may be added to help brown it.

Breaded Products

Fish sticks. Raw-breaded or oven-ready rectangular strips of fish about 1" wide and 4" long. They normally come from groundfish like haddock, pollock or cod, though hake, hoki and flounder are also used.

Similar products that vary only by portion size and shape include:

- Squares, often 4" x 4"
- Tapered, natural-looking fillets
- Novelty shapes targeted to children

Almost always breaded, these products can be stamped from fish with pre-cut forms or created by machines that mix fish with starch binders and force the product into a pre-set form.

Nuggets. Often battered but not breaded and cut into regular or irregular shapes averaging 1/2 to 1 ounce apiece, these are typically used in foodservice outlets, such as fish-and-chip eateries, or in schools. Nuggets are normally taken from the same species as fish sticks. They are cut either from fish blocks or from the loin portion of hand-cut fillets.

Patties. Breaded or non-breaded portions normally cut from frozen blocks or fillets of cod, haddock or pollock, then mixed with vegetables, starch and/or breadcrumbs, formed into patties, vacuum packed in trays and frozen for sale.

Melts. Nuggets stuffed with cheese and spices. Similar products include pressed forms like 1" x 3" fish "boats," into which a cheese-and-crab stuffing is poured. Stuffed, value-added products such as these normally weigh 5 to 8 ounces apiece.

Strips. Raw-breaded or marinated pieces of fish fillet (catfish is often used), similar to chicken strips. Surf clam strips are also breaded for use as fried clams.

Meat Analogs

Burgers. Similar to patties, made from minced fish mixed with various seasonings. Soy protein is sometimes added to reduce cost and increase moisture. Available breaded and unbreaded, cooked or uncooked, burgers are often made from salmon, cod, tuna or halibut.

Photo courtesy of Marine Harvest

Burgers made from meaty fish like tuna, salmon or halibut offer a satisfying and healthful alternative to beef. Other value-added seafood products mimic hams, hot dogs and sausages.

Hams and loaves. Spiced, seasoned, molded, ready-to-eat products shaped like hams or loaves, these can be sliced for sandwiches or entrées. Usually made of salmon and tuna, these are often high-quality products shaped from whole fillets, though minced fish meat is also used. Flavorings include smoked, garlic and black pepper.

Hot dogs. Typically made from salmon or minced groundfish like pollock, the meat for "sea dogs" is blended with herbs and spices, shaped to fit a hot-dog bun, then steam-cooked and/or smoked. Vacuum-packed, ready-to-eat franks are boneless. A typical serving is 1.5 ounce. Some seafood hot dogs are spiked with jalapeño peppers or stuffed with cheese.

Sausages. Low-fat, high-protein sausages (or "breakfast links") are typically made of salmon, though tuna and several other species are used. The sausages are processed by binding together fish meat (with the help of 2 to 3 percent salt), then adding spices and (optional) smoke or smoke flavoring. Some seafood sausages are briefly pre-cooked so they are ready to cook further and serve. Others are fully cooked and ready to eat. Spicy, gourmet versions are available.

Prepared Entrées

Stuffed. Many fish and shellfish are offered as frozen, stuffed entrées, employing seafood as the receptacle for the stuffing, as the stuffing itself or as both. Typical entrées range from stuffed sole to stuffed shrimp, though many other species are used.

Types of stuffing include crabmeat with breadcrumbs, cheese, shrimp/garlic, broccoli and cheese, spinach and cheese, lemon and wild rice or hollandaise. Flatfsh like sole and flounder offer a thin, delicate wrapping for stuffings. Lobster shells, crab shells, fish fillets or shellfish meats also can be stuffed.

Sauced. Some oven-ready entrées come with their own sauce, like sole amandine or teriyaki fish (the latter may come complete with a packet for mixing your own). Bulk seafood sauces and mixtures are also available for value-adding in-house.

Marinated. Frozen, pouched or fresh fish portions and frozen entrée-sized servings of shellfish are available pre-marinated in a selection of classic or ethnic flavors. Marinades range from traditional lemon-dill to Cajun to more exotic Asian soy-ginger and Hispanic-influenced chili-lime.

Salads

Among value-added salads offered ready-made in bulk are tuna-based salads, marinated scungili (conch) salad, calamari (squid) salad, mussel salad, octopus salad or elaborate blends such as "shrimp and scallop supreme," complete with roasted peppers and black olives in an Italian marinade.

Ready-made salads made with popular seafoods like tuna are a fast, healthful and cost-effective meal option.

These are normally offered fresh, in 5- or 10-pound packs, and boast a shelf life of three weeks. Seafood pasta salads featuring shrimp or crab are available in similar-sized packs. Surimi-seafood salads are also a popular and cost-effective option.

Smoked: Enhanced Flavor and Shelf Life

DEFINITION: A process by which salted seafood — fillets, steaks, loins, whole fish or shellfish — is flavored by being placed in a drying oven where dense smoke is passed around and through the product. Finfish commonly smoked are salmon, herring, haddock, pollock, whiting, catfish, trout and mackerel. Smoked shellfish include clams, oysters, shrimp, scallops and mussels.

Advantages

Added profit. Smoking creates tasty products from inexpensive, underutilized finfish like mackerel and exotic products from prime, high-quality fish like bluefin tuna.

Unlimited market. There's a sizeable range of seafood that can be smoked and a range of options for curing and smoking — from lightly to heavily salted, and nearly raw to jerky-like.

Shelf life. Smoked seafood will keep three months if properly refrigerated.

Disadvantages

Not shelf stable. Most smoked products other than jerky must be refrigerated as if they were fresh.

Checklist

- ☑ Look for a bright, glossy surface with no trace of blood or salt. Flesh should be firm but silky.
- ☑ Skin should be moist but not sticky to the touch, and flesh should flake away easily from the bones.
- ☑ Vacuum-packed smoked seafood should appear fresh and moist. Air in the package, swelling or loss of vacuum may indicate spoilage.

Cold-smoked salmon is more delicately flavored and textured than hot-smoked product, which is essentially cooked.

How It's Done

Oven types. Two types of ovens are typical in smoking: forced-air ovens, in which air and smoke are mechanically pumped around the product (normally a horizontal flow is used for seafood, which is typically placed on racks), or natural convection ovens, in which air and smoke flow freely around the product.

Smoke options. Various kinds of hardwoods are used during smoking, depending on the product being smoked, the flavor desired, available wood and regional traditions. In the Pacific Northwest, smokers use a lot of alder. In New England, they use more oak and maple. Hickory-smoked seafood is common in the South.

Curing. Before being placed in the smoker, fish is cured by being soaked in brine or coated or injected with salt. Curing firms up the flesh, adds flavor and gloss and removes moisture that allows bacterial growth. Seasonings like brown sugar, garlic or pepper are often added during the curing phase.

Brining tends to leave fish more tender than coating, or "dry salting." Coating helps dry the outside of the product, allowing it to acquire a denser, firmer texture. Injection distributes salt and spices throughout the fish flesh but can sometimes leave "pockets" of flavor.

After curing, fish are normally surface-dried before smoking to prevent the accumulation of moisture and assist in the even deposition of smoke.

Smoking Methods

There are two basic methods of smoking — hot and cold. Though they differ greatly, both provide adequate flow and exchange of air (vertical or horizontal) to remove moisture from the product.

Hot smoking. This process essentially cooks the fish by heating it to a minimum internal temperature of 145°F for 30 minutes, as required by federal law. This results in a firm, dense texture. After smoking, the product is rapidly cooled to prevent contamination.

Cold smoking. In this process, temperatures are kept below 95°F, since the product is not cooked but just air-dried and smoked. Cold-smoking produces a more delicate flavor and texture than hot-smoking.

Frozen Seafood: Freshness Redefined

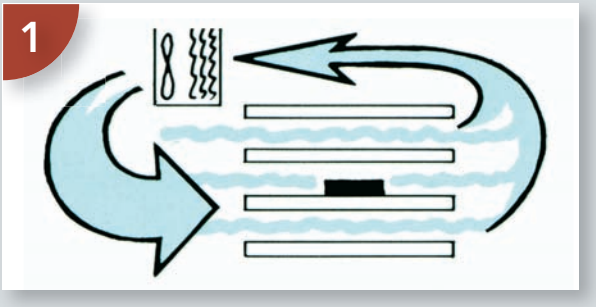
DEFINITION: The goal in freezing seafood is to bring the center of the product to a temperature of 0°F or lower as quickly as possible. Choice of freezing method — blast, cryogenic, plate or brine freezing — depends on product types, intended uses, packaging needs and cost.

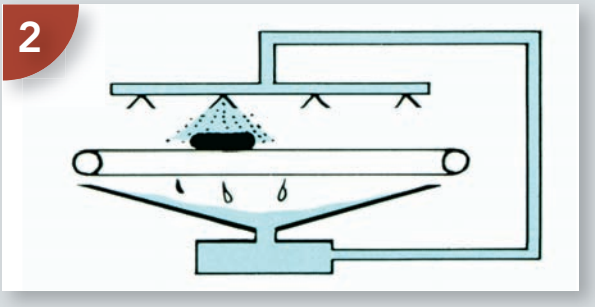
Advantages

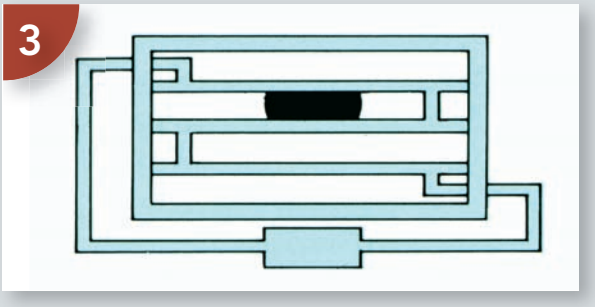
Quality. The texture and taste of quickly frozen fresh seafood is nearly the same as fresh. In fact, frozen-at-sea product is of much better quality than "fresh" fish that has been in a boat's refrigerated hold for over a week.

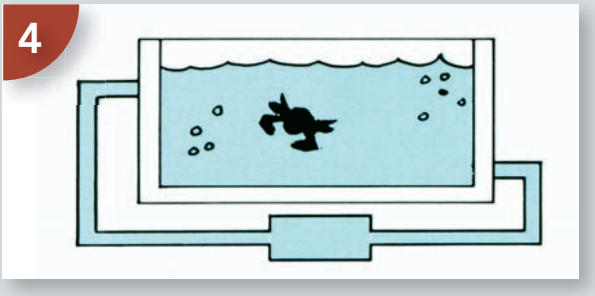
Safety. When seafood is frozen and stored at appropriately low temperatures (at least minus 10°F), bacterial growth is arrested, preserving the product and dramatically extending shelf life.

Economy. High-quality frozen fish is not only superior to a stale, unfrozen product but is much less









How Seafood Is Frozen

1. **Blast freezing.** Very cold air (minus 25° to minus 40°F) is circulated over a product that has been placed in trays or on racks in an enclosed space. Often the product is carried on conveyor belts through a horizontal tunnel or vertically in an ascending spiral. Tunnel belt speed varies with product size. IQF fillets are often blast frozen, as are larger dressed fish, like salmon.

2. **Cryogenic freezing.** An advanced, accelerated form of blast freezing in which individual products (e.g., shrimp, fillets) are exposed to super-cold air or, more commonly, to sprays of liquid nitrogen or carbon dioxide at temperatures of minus 150°F or colder. Cryogenic freezing offers distinct quality benefits, including a taste and texture more resembling fresh seafood.

3. **Plate freezing (or contact freezing).** Employs refrigerant flowing through parallel, hollow metal plates. The plates are gently squeezed together for maximum contact to produce a flat, frozen package. Fish blocks, layerpacks, shatterpacks and cellopacks are commonly frozen this way, as are blocks of shrimp and scallops. Plate-frozen products freeze in two to four hours at minus 40°F.

4. **Brine freezing.** Product is immersed in a brine solution that has been mechanically chilled to 0°F. The saltwater, which remains liquid to minus 6°F, surrounds and quickly freezes odd-shaped products like crab clusters and legs. The technique can also be used to freeze packaged products. Immersion brine freezing is generally employed aboard tuna purse seiners for at-sea freezing.

wasteful, easier to inventory and usually less expensive than fresh.

Variety. A wider range of frozen seafood is available than fresh seafood, including value-added forms like breaded/battered and complete dinners.

Disadvantages

Perception. Many consumers remain convinced that any fresh seafood is superior to frozen product.

Potential mishandling. To maintain quality, frozen seafood must be frozen properly initially, then kept at a constant temperature. It's not always possible to know if you're buying frozen seafood that's been properly frozen and stored.

Checklist

- ☑ Buy only good-quality frozen fish. Proper freezing can maintain quality but does not improve it.
- ☑ Ensure proper freezing. Slow or incomplete freezing affects texture, flavor and shelf life.
- ☑ Most frozen seafood should be glazed with a protective coating of ice to prevent dehydration and oxidation during storage and distribution.
- ☑ Excessive ice crystals inside containers and wrappings indicate loss of moisture — along with flavor, texture and shelf life — the result of temperature fluctuations.
- ☑ Inner plastic lining ("polybag") or plastic sheets or cellowrap surrounding a product should be of high-quality plastic and thick enough to give adequate protection.
- ☑ All frozen-seafood packaging should be tight and unbroken.

The Lexicon of Freezing

Advances in freezing technology and distribution systems have led to an increase in the amount of high-quality frozen seafood on the market. As demand for frozen fish and shellfish has grown, so has the vocabulary to describe these products. Here's a sampling of the frozen lexicon.

FAS (Frozen At Sea). FAS products may be frozen whole for later thawing and reprocessing on a factory ship or at a plant ashore, or they can be landed, filleted and frozen aboard the same vessel. Groundfish like pollock and cod are often filleted and frozen at sea. FAS products offer a quality advantage because they are frozen quickly after harvest.

IQF (Individually Quick-Frozen). Pieces of finfish or shellfish fast-frozen as single units, then glazed, bagged and boxed. The "quick" in IQF can refer to cryogenic methods that employ liquid nitrogen or carbon dioxide, or to blast freezing. It simply means the product was frozen in a matter of minutes or hours, not days. Products marked IQF that have been frozen in a storage freezer are incorrectly labeled, as they have been frozen too slowly and thus do not qualify as IQF.

Products frequently sold in IQF form include small, dressed whole fish like whiting, herring or smelt; peeled or shell-on shrimp, crab clusters and legs; whole fish like salmon, which are normally blast frozen, glazed and individually bagged; and scallops for retail sale.

Refreshed. Seafood that has been frozen, often in blocks, then thawed (or "slacked out") for resale. If handled properly, the quality of this product is high, though it should be labeled "refreshed" or "previously frozen" to avoid confusion or deception. Fillets labeled "fresh" that appear dry may have been previously frozen.

Twice-frozen (also known as double-frozen). Fish or shellfish that has been frozen at sea, then thawed for reprocessing ashore and frozen a second time after processing. Microwave heating may be used to partially thaw a frozen shrimp or fish block, permitting separation of individual units still in a frozen state. Fish or shrimp blocks are often "tempered" in this manner, heated until their temperature is just below freezing, at which point portions are chipped off, then battered,

How Seafood Is Thawed

Improper thawing can compromise the quality of any frozen seafood, no matter how it is frozen or packaged. Thawing methods can also affect the net weight of the product.

Frozen fish can be defrosted in air or water or by cooking directly from the frozen state. The best results are obtained when a product is thawed slowly (for 36 hours) at temperatures just above freezing. A complete thaw, especially under forced conditions of warm air or water, may release "natural juices" that represent a portion of the product's net weight and flavor. Always place thawing product in a drip pan to avoid build-up of melt water and drippings.

Thawing too long or at too warm a temperature may dry out the product and invite bacterial growth. Because of the superior heat-transfer properties of water, it is a faster thawing agent than air. The cold water should be kept moving (spraying works well) while gently agitating the product.

Whole or packaged fish may be thawed in water, but unpackaged fillets should not be defrosted in this manner because they become waterlogged and lose flavor through leaching.

breaded and immediately refrozen.

Refrozen, or "double-frozen," products like these should offer only minimal quality loss if handled properly.

Glazed. IQF products that have been sprayed with cold water or dipped into icy water, which freezes instantly into a protective film that eliminates air pockets and reduces the likelihood of freezer burn or rancidity. Glaze should be uniform and completely cover the product. Cracks in the glaze (not simply hairline fractures) or "holidays" where the glaze is missing entirely may indicate improper glazing and the necessity to re-glaze. Re-glazing is customary and necessary during prolonged storage when the original glaze has diminished.

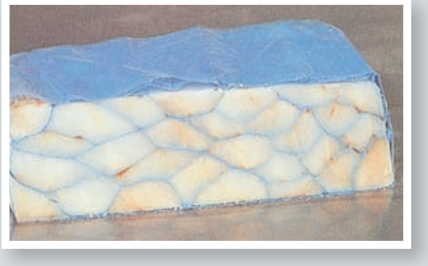
Beware, however, of excessive glazing and improper weight claims based on glazed weights.

Frozen Seafood Packs

Block. Seafood that has been placed in a form or carton and frozen in a plate freezer. Block-frozen products include shrimp, scallops, crab meat and finfish, including pollock, cod, haddock, flounder and whiting. Fish blocks, usually without skin and bone, are used as raw material for fish sticks, portions and as breaded or battered items. Shown is a 15-pound block of Alaska pollock.

Cellopack. The most common pack for frozen groundfish fillets, which are wrapped together, one to three fillets per ungraded packet, in cellophane or polyethylene film. Shown is a 5-pound cellopack containing six packets of Pacific cod. Since they are ungraded, cellopacks are comparatively inexpensive. They can also utilize irregular cuts not appropriate for other packs.

Layerpack. Packs in which high-quality, carefully graded fillets are layered with edges slightly overlapping so they freeze together. The layers, typically no more than four, are separated by polyethylene sheets, allowing fish to be divided and removed (usually an entire layer at a time) while still frozen. Shown is a cross section of a 15-pound Pacific cod layerpack.

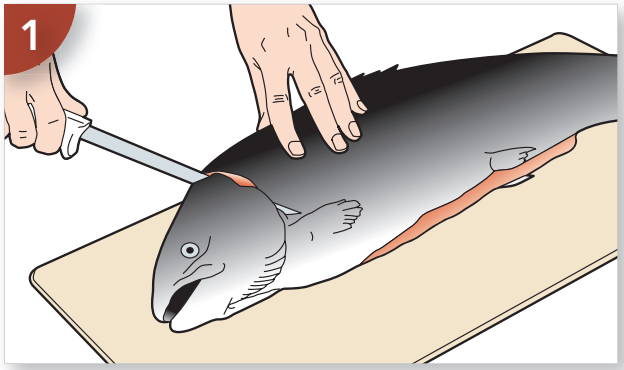


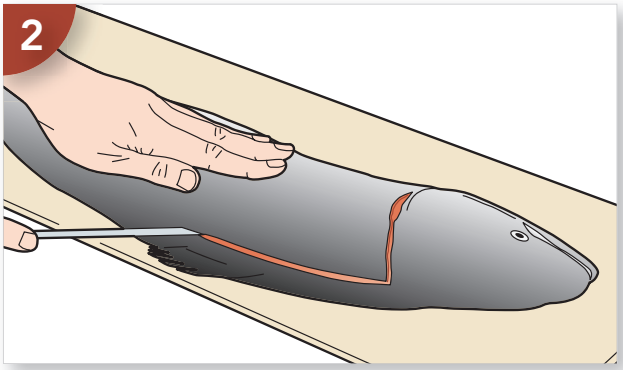
Shatterpack. Essentially, layerpacks that can be dropped or struck against a hard surface to break apart frozen fillets. Shatterpacked fish is wrapped in a manner that prevents the fillets from sticking together, allowing more control over the number of fillets removed at any one time. Shown is a cross-section cut from a 15-pound shatterpack of Alaska pollock.

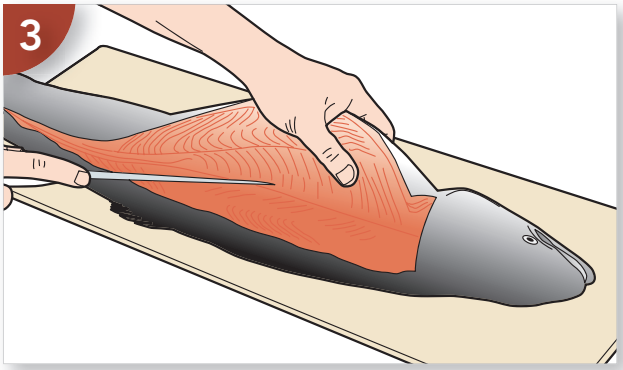
IQF. Individually quick-frozen, glazed fillets (or shellfish like shrimp and scallops) packed loosely in a polyethylene-lined box. These size-graded products retain their natural shape and are very easy for the end user to handle. However, the boxes occupy more storage space than other packs and are more easily damaged. Shown is a 25-pound box of 4- to 6-ounce IQF Alaska pollock fillets.

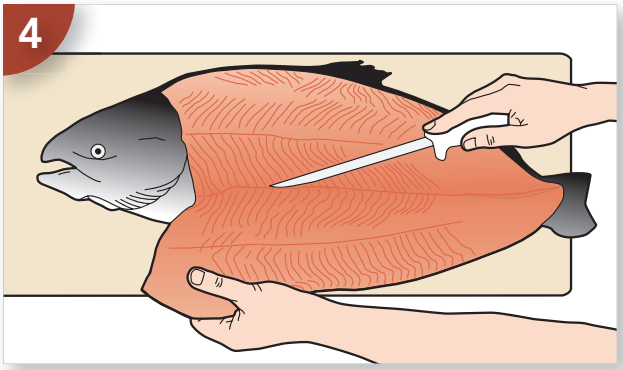
Filleting a Round Fish

All Preparation guide illustrations by Mirto Art Studio









1. With a sharp, thin-bladed knife, slice in an arc behind the gills from the top of the head down to the belly flap, cutting just to the backbone.

2. Make a cut the full length of the fish's back, from head to tail, to free the back side of the fillet. At the head, this cut will form a right angle with the cut made in Step 1.

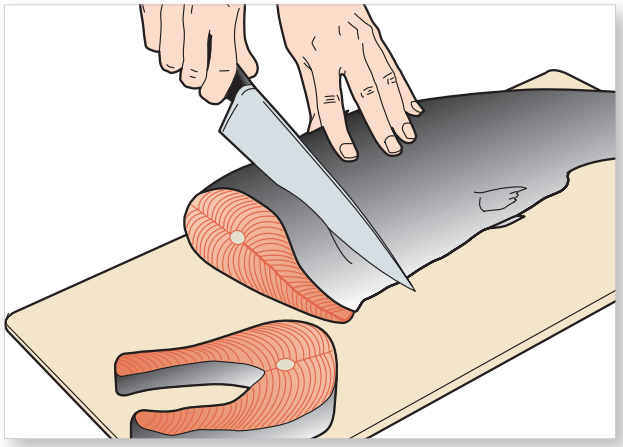
3. With the blade toward the tail, cut into the fish, feeling for the central bone with your knife blade. Use the ribs as a guide as you move along the length of the fish.

4. Peel back the flesh as you go, freeing it from the rack. Sever the fillet at the tail to remove. Then turn the fish over and repeat steps 1 through 4.

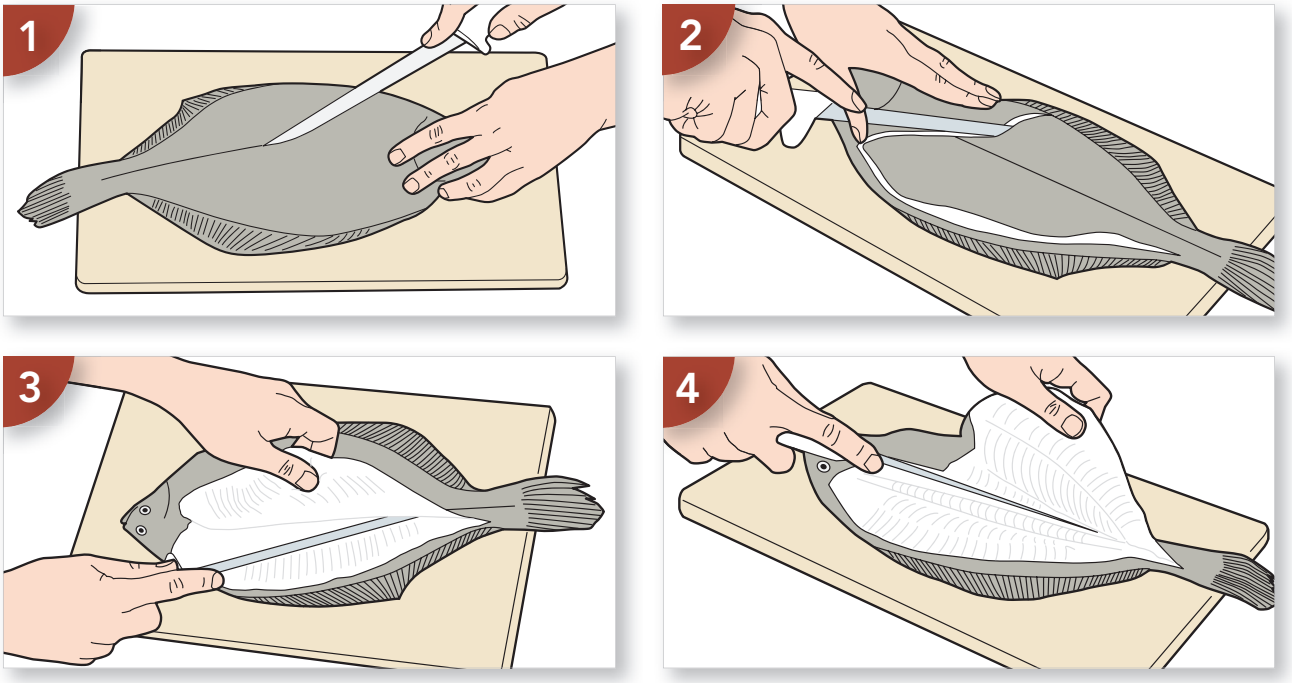
Steaking a Round Fish

Remove the head from a dressed whole fish by making a diagonal cut behind the gills, severing the backbone with a sharp, heavy knife.

Using the same knife, cut steaks by slicing crosswise through the fish, starting a couple of inches from the head end. Steaks should be of uniform thickness — about 1 inch. Reserve unsteaked head and tail portions for another use.



Filleting a Flatfish



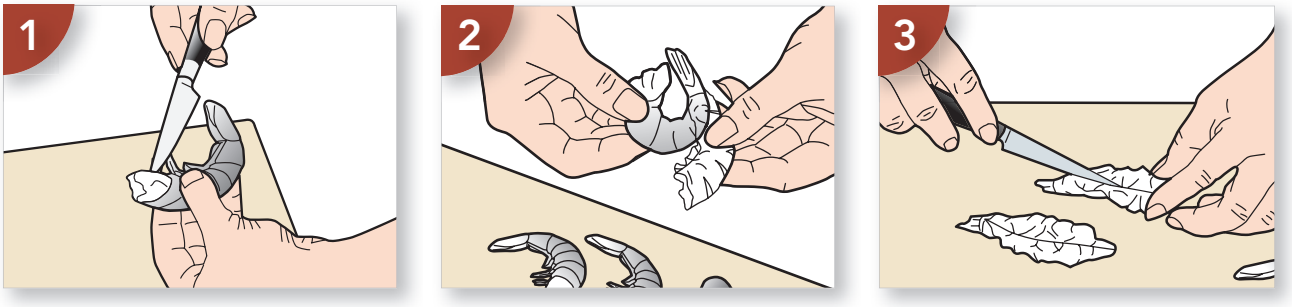
1. Place flounder, dark-side up, on cutting board. With sharp, flexible knife, make incision down the middle of the fish, cutting along spine, from gill to tail. Next, score through the skin along the fins on each side, slitting from tail to head.

2. Cut to the bone in an arc behind the head and visceral cavity. Skirting the viscera will result in a shorter fillet from that side of the fish.

3. Slide the knife blade into the cut at the head and use long strokes to free the flesh from the bones. Peel back the meat as you go, working toward the center cut, until the fillet is released.

4. Cut the second fillet away, working from the center cut out toward the fin edge. Remove the viscera before turning the fish over and repeating steps 1 through 4 to produce two more fillets.

Shelling, Deveining and Butterflying Shrimp

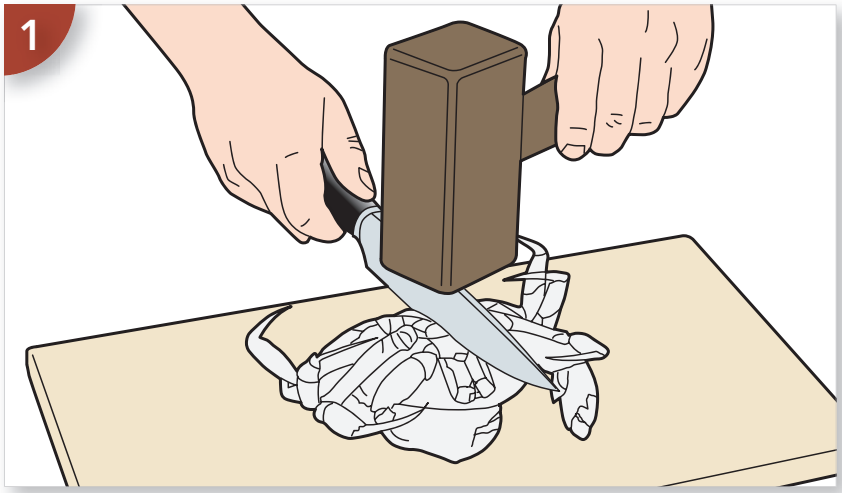


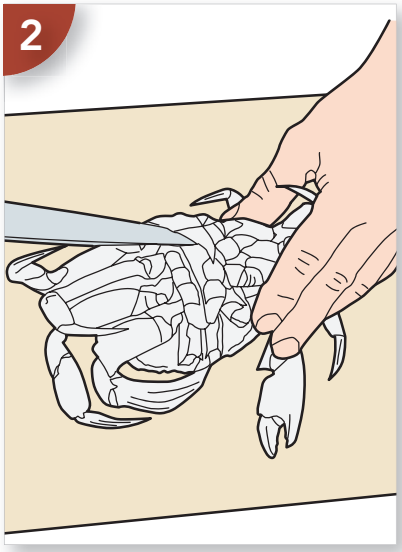
1. Slip the blade of a small, sharp knife between the swimmerettes, or legs, to slit the shell.

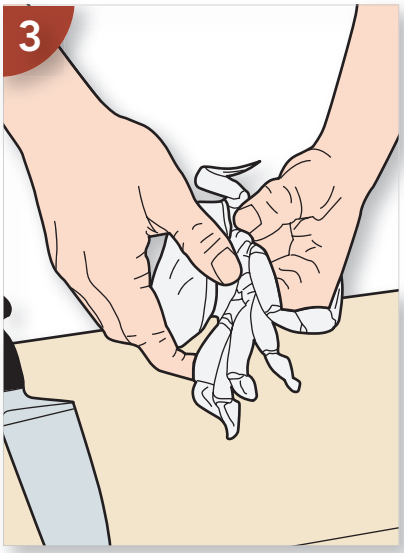
2. Peel off the shell and legs, leaving the shell on the tail if a fantail shrimp is desired. To devein, run shelled shrimp under cold running water or scrape vein away with knife tip.

3. Butterfly by cutting along the back of the shrimp, but not all the way through. Spread the halves open.

Cracking and Cleaning Live or Cooked Crab







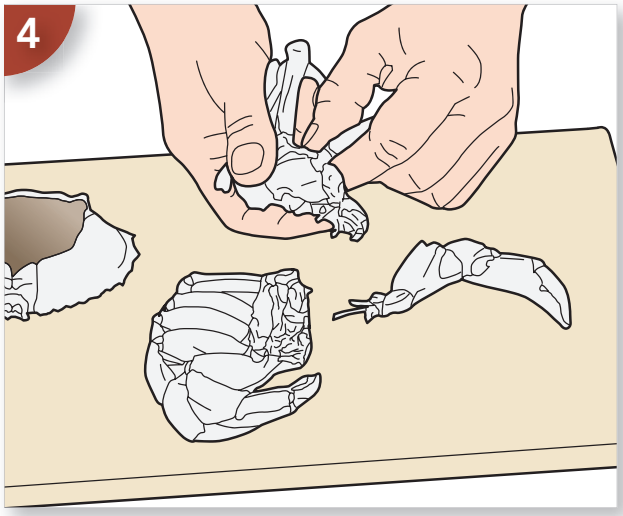
1. Place live crab on its back on a cutting board. Position a large heavy knife, blade down, in the center of the crab. Hit the back of the knife sharply with a mallet. It will kill the crab instantly.

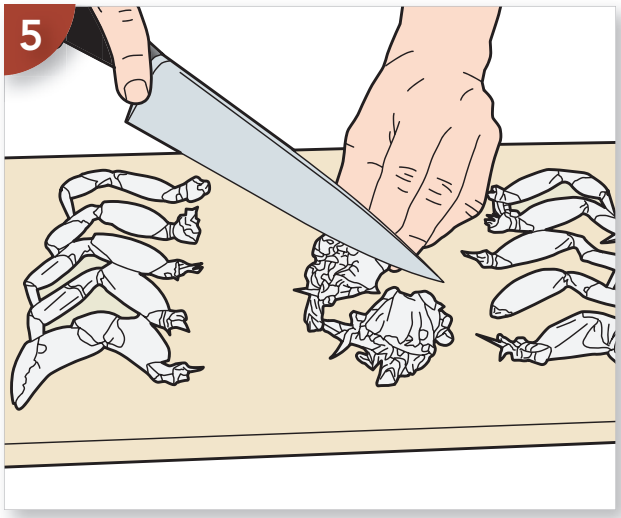
2. To clean raw or cooked crab, start by using the point of a knife to lift and break off the belly flap on the crab's underside.

3. Turn crab over and grasp top shell. Pulling firmly from the rear, lift off the shell and discard. This will reveal spongy gills; remove and discard them. If raw, rinse crab body well.

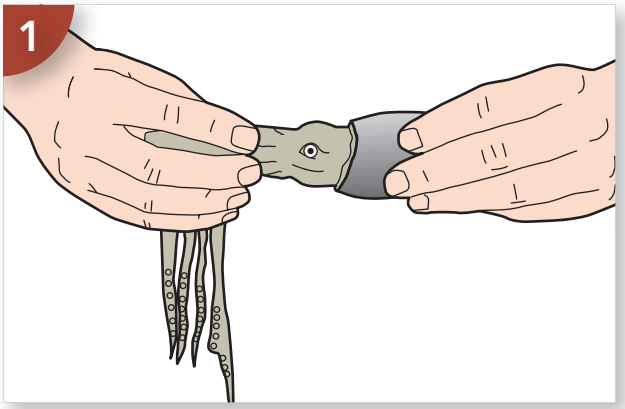
4. Cut crab body in half. Twist claws and legs off and set aside.

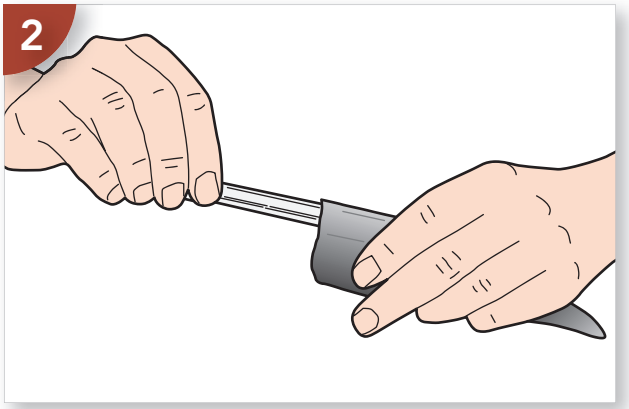
5. When claws and legs have been removed, quarter the crab body. If raw, rinse well. Use a metal pick or small fork to remove pockets of meat from cooked crab. Crack cooked claws and legs along edge of shell with a heavy cracker and remove meat.

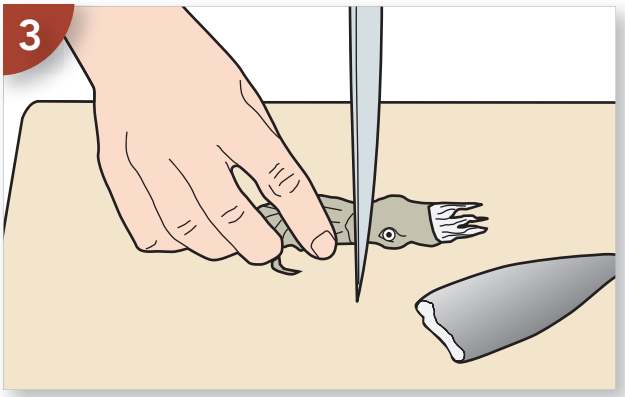




Cleaning Squid







1. Gently pull the head and tentacles from the squid body, or hood. The entrails will come along as well.

2. Reach into the tube-like body cavity and pull out the hard, transparent quill. Also remove any remaining innards.

3. Cut the portion with the eyes and intestines away from the tentacles and discard, reserving the tentacles.

4. Peel the transparent, speckled membrane from the hood and discard. This will reveal pure white meat. Turn the hood inside out and rinse well.

5. Cut the hood into rings, if desired, or leave whole for stuffing. Tentacles can be chopped for use in stuffing or left intact for marinating, frying, etc.

Cooking Guide

The Basics of Successful Seafood Preparation

What's so hard about cooking seafood? Nothing — except, maybe, narrowing down the almost limitless preparation options.

Cooking fish can be as simple as tossing a plain fillet in the oven for 10 minutes, or as complex as marinating tuna chunks to skewer with vegetables for grilling — and that's not very complicated. All you need to know are the basic cooking methods and a couple of tips that will ensure your success with them.

The standard rule of seafood cookery is that it takes 10 minutes per inch of thickness. Be aware, though, this varies depending on the density of the flesh, whether it's being cooked frozen or stuffed, etc. For instance, a dense-meated catfish fillet will take longer to cook through than a piece of cod the same size. You'll know it's done when the meat is opaque all the way through, flakes easily with a fork and has reached an internal temperature of 145°F.

Also, to ensure that cooking occurs evenly, turn under the thin ends of fillets to give a piece of fish that's uniformly thick. And keep in mind that fish will continue to cook a bit after you remove it from the heat, so time it carefully. Those pointers and the advice below are all you need to know to cook seafood like a pro. Be sure to share this information with your customers. This symbol (■) will also appear in the Finfish and Shellfish sections to guide you in choosing cooking methods, detailed below.

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■ Bake

What to use: All types of fish, lean and oily: fillets, steaks, roasts, whole dressed fish. If wrapped in foil, shellfish can also be baked.

What to do: For a simple treatment, drizzle lean fish with butter or brush with oil. Add cooking liquid like white wine (to 1/4 inch in bottom of pan) with herbs to keep fish moist. Season as desired. Bake in preheated 400°F oven. You can also oven-fry whole, small fish or fillets. Brush fish with oil, roll in seasoned breadcrumbs and bake on greased baking pan at 450°F.

■ Broil

What to use: Fish fillets or steaks at least 1 inch thick. Higher-fat fish like salmon or sea bass works best, as it remains moister, but just about any finfish or shellfish can be broiled successfully. Shellfish options include shrimp, peeled or not; shucked scallops, even oysters, clams and mussels, stuffed or on the halfshell.

What to do: Lean fish and all shellfish should be marinated first and/or basted during broiling. At the very least, lightly oil the seafood first. Preheat the broiler, and broil fish or shellfish with rack 4 inches from top heat element. Add fresh herbs toward end of cooking so they won't burn.

Preparation

Fry

What to use: Lean fish (fillets, portions, strips, nuggets, even whole, dressed fish); shrimp, scallops, clams, squid rings.

What to do: To succeed with deep-frying, use good-quality vegetable oil and keep it at 375°F. Depth of oil in pan should be at least 2 inches. Use a crumb or batter coating on the seafood to be fried. Fry in batches to keep temperature of oil from dropping (this is critical in preventing seafood from absorbing the cooking oil). Turn pieces occasionally and cook until golden brown. Drain on paper towels.

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Grill

What to use: Oily fish like tuna, mackerel and salmon. Use steaks and fillets at least 1/2 inch thick, or whole, dressed fish. Skin-on fillets work nicely, as they hold together well. Grill large, shell-on or shucked shellfish on skewers.

What to do: Marinate or season seafood as desired. Drain marinated seafood well before grilling, reserving marinade for basting. Oil grill surface well to prevent sticking. Grill top-side down first; turn, baste and finish cooking with skin-side down. Lay skewered shellfish directly on grill. Baste often while cooking.

American Spice Trade Association

Poach

What to use: Lean fish — fillets, steaks or whole — especially benefit from this moist cooking technique. Avoid poaching oily, dark-meated fish like mackerel or tuna. Salmon is the exception here.

What to do: Select a cooking liquid — water, broth, wine, milk, etc. and season to taste. Use a big enough pan and enough liquid to cover the fish. Bring to a boil, reduce heat to simmer and add seafood. Continue to simmer, covered, till done.

Alaskan Seafood Marketing Institute

Sauté

What to use: Small whole fish, like trout; thin, skinless fillets, like flounder; thin steaks. Shrimp, peeled or not; softshell crabs; shucked scallops, squid. Oily fish like mackerel or salmon don't lend themselves to this technique.

What to do: Sautéing is essentially frying, but in a small amount of fat. If desired, first dredge seafood in seasoned flour, shaking off excess. Melt enough butter or margarine to just cover the bottom of a pan (mixing olive oil in will prevent butter from burning). Heat fat over moderately high heat. Add seafood and sear, then lower heat to finish cooking. Turn so seafood browns evenly.

Camera Hawaii and Hawaii Seafood Promotion

Steam

What to use: All lean fish: fillets, steaks, small whole fish. All shellfish. Oily fish do not benefit from steaming.

What to do: Steaming is done in a tightly covered container in which seafood is placed on a rack (with or without a bed of vegetables) over boiling water or other liquid. With clams and mussels, place the shellfish directly into a small amount of liquid (water, white wine, beer, etc., with seasonings, if desired) in a covered pan and steamed until they open.

Ipswich Shellfish Company

Sushi

Seafood Plays a Pivotal Role in This Popular Cuisine from Japan

Sushi as we know it today evolved from an ancient Japanese method of preserving raw, cleaned fish by fermenting it in salt and rice. The result was an edible, pickled product. Now, sushi is found across the United States in restaurants, retail cases and even baseball stadiums. It is designed to be eaten as finger food and can be served as an appetizer or a complete meal.

Common Types of Sushi

One of the most common forms of sushi, *nigiri-zushi*, originated in Tokyo. It features a piece of raw seafood on a small pad of seasoned rice.

The form that is most familiar in U.S. sushi bars and retail display cases is the convenient, "rolled" style of sushi called *nori-maki sushi*. For this, narrow strips of seafood or other ingredients are placed on a bed of vinegared rice and spread on a sheet of *nori* (dried seaweed), which is tightly rolled and then sliced into bite-size pieces.

The most popular maki rolls in this country are the California roll, made with crab or imitation crab, avocado and cucumber; the tuna roll, made with raw tuna; and the spicy shrimp roll with cooked shrimp in a spicy sauce.

Many chefs or manufacturers put their own unique "twist" on a popular maki variety by adding another ingredient.

Some other forms of sushi are *Chirashi sushi*, which is sushi rice with seafood and various ingredients either mixed in or placed on rice, and *sashimi*, fresh fish served raw.

The fish is sliced paper thin or up to 1/2 inch thick, depending on the species of fish. *Sashimi* is served with soy sauce and wasabi.

Becoming a sushi chef in Japan requires many years of training under a master sushi chef, and the industry there is male-dominated.

In the United States, however, the training is different, thanks to sushi academies and culinary schools that train aspiring male and female chefs in the art of making sushi.

Sushi Terminology

Deciphering the terminology associated with sushi is essential if you want to market the cuisine successfully. Below are the Japanese names for some of the species commonly used in sushi.

Ama-ebi	raw shrimp
Anago	sea eel
Chutoro	marbled tuna belly
Ebi	boiled shrimp
Hamachi	young yellowtail
Hirame	flounder
Hotategai	scallop
Ika	squid
Ikura	salmon roe
Kani	crab
Katsuo	bonito
Odori-ebi	live shrimp
Maguro	tuna
Saba	mackerel
Sake	salmon
Shiromi	seasonal whitefish
Suzuki	sea bass
Toro	tuna belly
Uni	sea urchin roe
Unagi	freshwater eel

Other Sushi Terms

Inari-zushi	seasoned rice and vegetables wrapped in a "bag" of fried tofu
Nori	seasoned dried seaweed
Sashimi	raw fish
Shoyu	soy sauce
Wasabi	Japanese horseradish

Source: *The Great Sushi and Sashimi Cookbook*, Whitecap Books

Fresh, top-quality fish is essential for sashimi.

Sushi Safety

Food and Drug Administration regulations say fish to be served raw must be frozen first to kill parasites. The only exception to this rule is tuna, but because many tunas are harvested in remote areas, most are flash-frozen to preserve the quality of the flesh before it gets to market. Eel and octopus are always cooked.

Buying seafood to serve as sushi or sashimi means sourcing top-grade product. Most sushi chefs prefer to buy their sashimi-grade tuna directly from suppliers in Japan. Whether you're buying from overseas or sourcing domestically, know your supplier and communicate your quality specifications, even when buying prepackaged sushi for retail sale.

Contrary to popular belief, the term "sushi" does not mean raw seafood. It refers to the specially flavored rice that accompanies vegetables or seafood. The common assumption that sushi is raw fish is a myth the sushi industry — chefs, manufacturers and retailers alike — is trying to dispel.

Keeping Seafood Safe

The Best Protection Is Understanding the Hazards

While most seafood sold in the U.S. market is wholesome and unlikely to cause illness to consumers, there are some areas of risk, mostly the result of poor handling practices, improper cooking or illegal harvesting from contaminated waters — all preventable hazards. The best way to reassure consumers about the safety of seafood is to be upfront about the possible risks. It's even more important to inform them about the many safeguards — both federally mandated and those practiced by your establishment — that protect them from those risks. Following is an overview of potential seafood-specific hazards and ways to prevent them.

Contaminants

Methylmercury

Mercury is a naturally occurring element, but human activity has increased the amount released into the environment. Industrial sources of mercury include mining, burning oil and coal and manufacturing steel, cement, paper and pharmaceuticals. After entering the water from the air, mercury transforms biologically into methylmercury, the most toxic form, which is absorbed by fish. Large, predatory fish contain the highest levels. Eating fish is the main source of human exposure to methylmercury.

High levels of methylmercury in the bloodstream of unborn babies and young children may harm the developing nervous system. The Food and Drug Administration advises pregnant women, nursing mothers, women of child-bearing age and young children to avoid eating swordfish, shark, king mackerel and tilefish, limit consumption of albacore tuna to 6 ounces per week and eat up to 12 ounces per week of seafood low in methylmercury, such as light tuna, salmon, pollock and catfish.

Safeguards

1. Consumers in high-risk groups should limit consumption of affected species as specified in the FDA advisory.

2. The FDA periodically tests seafood for methylmercury. The agency's legal limit is 1 part per million.

PCBs

Polychlorinated biphenyls are a group of synthetic organic chemicals that do not burn easily and do not break down easily in the environment. PCBs were commonly used as coolants and lubricants in electronics. But the United States stopped manufacturing PCBs in 1977, and most industrial countries have followed suit. PCBs are ubiquitous in soil, air and water and accumulate in animal fat. PCBs are found at various levels in many foods, including seafood. All humans living in industrial countries have some PCBs in their bodies.

PCB levels in foods have dropped 90 percent over the last 30 years, according to the FDA. The health benefits of eating seafood far outweigh the risks, say nutritionists. The omega-3 fatty acids found in salmon and other oil-rich fish reduce the risk of sudden cardiac death by 20 to 40 percent, compared to a 0.001 percent increase in lifetime cancer risk due to PCBs, according to the Salmon of the Americas trade group.

Safeguards

1. Buy farmed fish from producers who use fishmeal and fish oil containing as few PCBs as possible.

2. The FDA periodically tests seafood for PCBs. The agency's tolerance level is 2 parts per million.

Chloramphenicol

Chloramphenicol is an antibiotic that has been used in aquaculture in the past. But most countries, including the United States, have banned its use in food production, since about one in every 50,000 humans who ingest therapeutic doses, or 1,000 to 1,500 milligrams, of chloramphenicol develops aplastic anemia, a potentially fatal bone-marrow condition.

The FDA began actively testing seafood for the antibiotic in 2002. Trace amounts of chloramphenicol found in shrimp, crawfish and blue crab in recent years are measured in parts per billion.

Safeguards

1. The FDA has a zero-tolerance

Safety

Six Ways to Fight *Vibrio Vulnificus*

Depuration. Oysters that have been feeding in polluted waters are placed in clean water and left there for two or three days. Using their own filtration apparatus, oysters purge the *Vibrio* bacterium and fecal-related contamination from their systems. If *Vibrio* is present solely in the oyster's filtration system and not elsewhere in the animal, the depuration process will work. On the other hand, if *Vibrio* is in the tissue of the oyster itself, all bets are off.

Pasteurization. *Vibrio* can't stand heat. When temperatures are raised sufficiently, the bacteria are killed. However, the oysters can then no longer be marketed as a raw product, because, typically, the steam cooks them.

The AmeriPure Process. While this is frequently referred to as pasteurization, it is not. Instead, the patented AmeriPure Process is a post-harvest temperature treatment that employs both warm and ice-cold waters in such a way as to allow the treated oysters still to be sold as a raw product.

Irradiation. Meat, poultry, some dairy products and fruits and vegetables have FDA approval for radiation treatment as a means of killing off errant bacteria, including *Vibrio*. And many, including representatives of the FDA, believe that seafood will be next. While the public has historically been less than accepting of irradiated foods, consumer resistance may be softening as concern for food safety grows.

High pressure. This is the most recent development in oyster purification. Researchers have produced *Vibrio*-free oysters by applying pressure of up to 40,000 psi.

IQF freezing. Cryogenically freezing oysters (to minus 120°F) reduces *Vibrio vulnificus* to non-detectable levels. These individually quick-frozen, or IQF, oysters are shipped as frozen product to buyers and, when thawed, can be sold as raw oysters.

High-Risk Categories for *Vibrio*

Consumers who are at greatest risk of infection by *Vibrio vulnificus* are those suffering from the following:

- Liver disease
- Chronic alcohol abuse
- Cancer (especially individuals undergoing chemotherapy or radiation treatment)
- Lymphoma, leukemia, AIDS, Hodgkins disease or diabetes mellitus
- Chronic kidney disease
- Inflammatory bowel disease (or any condition requiring use of immunosuppressive drugs)
- Steroid dependency
- Conditions requiring medication to reduce stomach acid

policy for chloramphenicol in food sold in the marketplace. The agency, which has a detection level of 0.3 parts per billion, periodically tests seafood for chloramphenicol and detains product containing the substance.

2. Buy shellfish from suppliers who test their product for chloramphenicol.

Bacteria

Vibrio Vulnificus

Vibrio vulnificus is a naturally occurring bacterium found in warm, coastal waters. Since it is not a result of pollution, *Vibrio* can be present even in clean waters approved for the harvest of oysters and clams, filter-feeding animals that can concentrate *Vibrio* bacteria in their systems.

Vibrio vulnificus infections can be transmitted to humans when improperly cooked or raw shellfish is consumed. Most people's immune systems are capable of fighting these infections. However, people with impaired immune systems can develop a severe, potentially fatal infection.

Safeguards

1. Consumers in high-risk categories shouldn't consume raw shellfish, particularly oysters.
2. Prepared shellfish should be thoroughly cooked to kill the *Vibrio vulnificus* bacteria.
3. Avoid cross-contamination

What are the chances of becoming infected by Vibrio? Rare! The problem is primarily restricted to people in high-risk categories. They should avoid eating raw shellfish.

between raw and cooked shellfish.

4. Buy from reputable suppliers. Some dealers subject product to one of several purification processes.

Listeria

Listeria monocytogenes has been found in soil, vegetation, marine sediments and water throughout the world. The illness it causes in humans, listeriosis, occurs most commonly in the summer.

The bacteria is capable of multiplying at low temperatures (its growth range is from 32° to 113°F), so it is possible for a small number of organisms to grow to an infectious dose even when food is properly refrigerated.

For this reason, the greatest threat of listeriosis is from ready-to-eat products that require no further cooking, such as seafood salad.

Smoked fish is especially susceptible, but other seafoods that have tested positive for *Listeria monocytogenes* include raw fish, cooked crabs, raw and cooked shrimp and raw lobster. It has also been found in dairy products, vegetables, beef and poultry.

Safeguards

1. Follow good food-safety practices when handling raw and cooked seafood.

2. Cooking rapidly kills *Listeria monocytogenes* in seafood. Chill promptly after cooking and keep refrigerated until ready to use.

Pollution

Hepatitis and Gastroenteritis

Shellfish such as clams, mussels, oysters and scallops are prone to bacterial and viral contamination from sewage pollution. Shellfish feed by pumping water through their digestive systems and filtering microorganisms, which accumulate in the stomach.

When contaminated shellfish are eaten, the pathogenic organisms present in the animals can cause sickness. The two most common viral conditions suffered by people who eat raw or undercooked mussels, clams or oysters from contaminated waters are gastroenteritis and hepatitis.

Gastroenteritis is an inflammation of the lining of the stomach and intestines.

Symptoms (nausea, vomiting and diarrhea) occur 24 to 48 hours after eating contaminated seafood and generally last up to 48 hours.

Infectious hepatitis (Hepatitis A), a condition marked by inflammation of the liver, has been associated with seafood consumption.

Symptoms can occur up to a month after ingestion and may include fever, nausea, vomiting and abdominal discomfort. Since Hepatitis A affects liver function, it is often characterized by jaundice.

Of the various types of seafood, raw molluscan shellfish present the greatest risk of illness from viruses.

Safeguards

1. Buy only from certified dealers to ensure shellfish were harvested from legal areas. Check certification tags for harvest location. 2. Steam mollusks 4 to 6 minutes. Steaming just until shells open (which can occur after only 60 seconds) is not sufficient to kill viruses. 3. Freezing is not an effective way to inactivate shellfish viruses.

Shellfish Toxins

Red Tide

Filter-feeding mollusks such as clams, oysters and mussels can become toxic to humans during what are popularly called "red tides." A red tide is caused by a dramatic population increase of certain species of phytoplankton, or algae.

When the algal density, or "bloom," gets high enough, the water can appear red, thus the name "red tide." However, water color is not a good indicator of shellfish toxicity, since it is common for filter-feeding mollusks to become toxic even at phytoplankton concentrations below that necessary to discolor the water.

There are four human illnesses associated with shellfish and toxic algal blooms: paralytic (PSP), neurotoxic (NSP), amnesic (ASP) and diarrhetic (DSP) shellfish poisonings. Occurrences are extremely rare, however, since regulations imposed by the National Shellfish Sanitation Program (NSSP) effectively protect consumers from shellfish toxins.

Under NSSP guidelines, shellfish are periodically tested for biotoxins. Areas that are found to exceed quarantine levels are closed to harvesting. The shellfish beds are reopened to harvesting only after toxin levels remain below quarantine levels for an extended period of time.

Safeguard

Toxins in shellfish cannot be destroyed by normal cooking, freezing or smoking. The best prevention

What are the chances of getting sick from toxins like red tide? Remote. Consumers are protected from shellfish toxins by regulations imposed by the National Shellfish Sanitation Program.

Rules for Safe Seafood

Keep it cold, keep it clean, keep it moving

1. Buy only from reputable suppliers.
2. Practice stringent inspection, sanitation and refrigeration in your own operation.
3. Guard against cross-contamination of cooked product by exposure to raw fish, meat or poultry.
4. Understand causes of food poisoning and conditions under which food-poisoning bacteria grow.
5. Monitor the cleanliness of product, packaging, ice and delivery vehicle.
6. Check product temperature by inserting a probe into the thickest part of the product.
7. Check fish flesh for parasites. Many parasites are very difficult to see, including anisakis. Cooking to an internal temperature of 145°F kills parasites, as does rapid freezing to minus 40°F or freezing at 0°F for 72 hours.
8. Visit your supplier's operation to observe firsthand the storage, processing and sanitation practices.
9. Keep documentation on all products, so sources can be traced should food poisoning occur.

of shellfish poisoning is to prevent toxic shellfish from ever reaching the consumer. The NSSP Marine Biotoxin Monitoring Program effectively eliminates toxic shellfish from commercial distribution.

Domoic Acid

Domoic acid is a naturally occurring marine toxin that is produced by the marine algae *Nitzchia pungens*, a single-celled diatom that floats on the surface and at midwater levels.

The algae tend to grow, or bloom, in colder waters and can affect molluscan shellfish and crustaceans off the Pacific Northwest and both the Atlantic and Pacific coasts of Canada, particularly during fall and spring.

Domoic acid is heat-resistant and cannot be cooked out of seafood products. If ingested in large enough quantities, it can cause amnesic shellfish poisoning, or ASP. Known incidences have been traced to consumption of recreationally harvested clams from affected areas. No documented cases of illness have been reported from commercially harvested products.

Safeguard

A monitoring program involving federal, state and local agencies, along with universities and industry, exists to detect the presence of domoic acid, close fisheries if necessary and provide early warning to protect the public health.

Finfish Toxins

Ciguatera

Though rare, ciguatera is the most frequently reported illness associated with the consumption of seafood. It results from eating tropical and subtropical reef fish such as snapper and grouper in which ciguatoxins have accumulated.

How can ciguatera be avoided? Though ciguatera is rare, buyers of tropical marine fish from reef waters can minimize the threat by using only reputable vendors.

Ciguatoxic fish cannot be detected by appearance, taste or smell. Raw and cooked whole fish, fillets or parts have no signs of spoilage, discoloration or deterioration.

There are only a few areas of the United States in which ciguatoxic fish are native: Florida, Hawaii, Puerto Rico and the Virgin Islands. Most of cases of ciguatera in the United States are reported from these areas; however, sporadic cases have occurred in non-tropical areas and are associated with importation of tropical species.

Safeguards

1. Buy reef fish only from reputable dealers.
2. Do not prepare dishes using the heads or internal portions of tropical reef fish species.

Scombroid Poisoning

Scombroid poisoning (also referred to as histamine poisoning) is caused by eating certain types of fish that have been handled or stored improperly. The name scombroid poisoning comes from the fish families Scombridae, which includes tuna and mackerel. But illness can be caused by non-scombroid species like mahi-mahi and bluefish.

The illness occurs after ingesting fish in which histamines have formed due

to improper refrigeration. Symptoms of scombroid poisoning can become evident within minutes to two hours following consumption.

This rapid onset is one reason scombroid poisoning may be reported more often than many other food poisonings. Initial signs suggest an allergic response, with facial flushing and sweating, burning-peppery taste sensations in the mouth and throat, dizziness, nausea and headache.

Cooking, freezing and smoking are ineffective in removing scombrotoxins from fish flesh. The best way to avoid scombroid poisoning is to prevent production of the toxin.

Safeguards

1. Potentially toxic fish should be gutted, bled and iced or refrigerated immediately after harvest. Store fresh fish in the coldest part of the refrigerator, below 35°F.

2. Frozen fish should be defrosted in the refrigerator at 32° to 35°F or under cold running water, not at room temperature.

3. Use a histamine analysis test to determine presence of histamines in suspect fish. The Food and Drug Administration has established an action level for histamine in albacore, skipjack and yellowfin tuna.

Parasites

Fish Worms

Almost all living organisms can become infested with parasites. Fish are no exception. The most common parasites in marine and freshwater fish are worms, but they are only a problem in undercooked fish or fish eaten raw without prior freezing.

The Centers for Disease Control in Atlanta states that illnesses caused by ingesting parasites are extremely rare in the United States. The most serious problem is the consumer's negative reaction to parasites.

The most frequently observed parasite in marine fish is roundworms (or nematodes). Cod, flounder and grouper are among species that may have nematodes.

Another small roundworm, anisakis, can be present in salmon. An illness, anisakiasis (resulting in severe gastric upset), can be caused by ingesting the live roundworm larvae. A flatworm is also common in wild salmon.

Safeguards

1. Cook fish to an internal temperature of 145°F or hot-smoke to kill all nematodes and fish tapeworms.

2. Freeze fish to an internal temperature of 0°F for at least 24 hours (three days are recommended).

3. Inspect flesh of species prone to infestation or buy fish that has been "candled," a process by which fillets are placed on an illuminated table so parasites can be detected and removed.

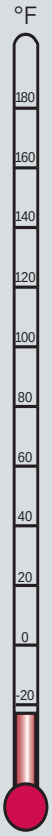
Seafood-Borne Illness

Cross Contamination

Cross-contamination refers to bacterial growth resulting when raw seafood or seafood juices come into contact with cooked seafood or other food products that will not be cooked. The potentially harmful bacteria can come from the immediate surroundings and the handler as well as from the foods themselves. Any practice by fishermen, seafood processors, retailers, restaurants, recreational fishermen or consumers that allows transfer of bacteria from raw seafood to a ready-to-eat product contributes to potential food poisoning.

Seafood Handler's Thermometer

Critical temperature phases



Cleaning Water
Above 180°F
Point-of-contact water temperature for cleaning equipment, floors, walls, etc.

Danger Zone
40° to 140°F
Bacteria grow rapidly. Foods should pass through the Danger Zone as rapidly as possible.

Critical Zone
40° to 100°F
The growth range of most food-poisoning bacteria.

Thawing
32° to 35°F
Ideal for slow thawing to minimize drip loss and protect flavor, aroma and texture. Allow 24 to 36 hours, and let product drain.

Fresh Storage
30° to 40°F
Food-spoilage-rate is minimized. (Note: for every 10°F rise in storage temperature, shelf life is halved.)

Freezing
27° to 30°F
Most of the water content of seafood is converted into ice.

Frozen Storage
0° to –20°F
Quality of frozen seafoods is maintained. Storage life doubles for every 10°F decrease in temperature.

Quick Frozen
Below –20°F
Rapid freezing rate.

Source: National Fisheries Institute

Safeguards

1. Wash hands thoroughly with hot soapy water before and after handling raw seafood.

2. Bacteria lingers in towels, cloths and sponges you reuse, so keep them clean. Do not reuse a dishcloth or sponge used to clean up juices from fish or shellfish without washing it first. Replace sponges frequently.

3. After handling raw products, wash everything you've used, including dishes, knives, cutting boards and your hands, with hot, soapy water before continuing food preparation.

4. Don't use the same container that held raw products for storing or serving cooked products. Raw juices can contaminate the cooked food.

5. When displaying seafood, keep cooked and raw products separated.

Supply Watchdogs

The U.S. food supply is considered among the safest — if not the safest — in the world. We enjoy this reputation due to the vigilance and effectiveness of federal and state regulatory agencies, charged by law with protecting the public health.

All fish and seafood bought and sold in this country — whether imported or domestically processed — must meet tough food-safety standards mandated by the HACCP (hazard analysis of critical control points) program the seafood industry implemented in December 1997.

The FDA conducts sanitation inspections of seafood-processing operations and evaluates fish-handling procedures in processing facilities. The FDA has the authority to seize and destroy any unacceptable product and to impose criminal penalties for failure to follow a site-specific HACCP plan.

Are imported seafoods especially risky? No. The FDA can detain, refuse entry to and destroy at point of entry any seafood products that don't meet U.S. safety requirements.

In addition to the mandatory HACCP program, many processors pay annual fees for the voluntary inspection and grading services the National Marine Fisheries Service (NMFS) of the U.S. Department of Commerce provides. These include the "PUFI" program (packed under federal inspection), the "Grade A" program, lot inspection and sanitation inspections of processing facilities.

Imported seafood is also overseen by the FDA, which is authorized to detain, refuse entry to and — if necessary — destroy products at the point of entry into this country.

NMFS, the Environmental Protection Agency and coastal states are other government agencies that participate in seafood-regulation programs that monitor product safety.

Pesticide-residue tolerance levels are set by the EPA, which also monitors water conditions. Shellfish-harvesting waters are monitored according to standards set by the National Shellfish Sanitation Program, an organization of shellfish-producing state, federal and municipal officials and representatives of the shellfish industry. Testing is done by the coastal states in cooperation with the FDA.

In the wake of the Sept. 11, 2001, terrorist attacks, the 2002 Public Health Security and Bioterrorism Preparedness and Response Act was enacted to further protect the nation's food supply.

Now importers must notify the FDA of incoming shipments several hours before they're due to arrive at the port of entry, and domestic and foreign food facilities must register with the FDA and keep records so the agency can trace the origin of tainted food. Retail outlets, restaurants, farms and fishing vessels, except at-sea processors, are exempt from maintaining records.

The FDA can also detain any food posing "a threat of serious adverse health consequences or death" up to four days for perishables and up to 30 days for non-perishables.

In 2005, the U.S. Department of Agriculture began enforcing Country of Origin Labeling (COOL), which was adopted as part of the 2002 Farm Bill and requires retailers to label seafood products as to their country of origin and whether they're wild or farmed.

Seafood used as an ingredient in a processed food item is exempt from COOL, including cooked-, canned-, cured- and smoked-seafood products such as fish sticks, breaded shrimp, pickled herring, surimi seafood, soups, stews, chowders and pâtés. So are marinated seafood and combinations such as seafood medleys and crab-stuffed fish fillets.

Only the USDA has the authority to enforce COOL. Retailers must keep records that identify a product using a lot number or other unique identifier for one year after the transaction so the agency can trace violations. Suppliers must also maintain records identifying the source and recipient of a product for one year.

Quality Guide

When you buy seafood, you expect it to meet certain high standards. If the quality falls short of your expectation, chances are you'll refuse to make a purchase. Your customers are the same way. They expect the very best from you, and if they don't get it, they'll go to someone else. Or, worse yet, they'll simply give up on seafood altogether. Don't let that happen. Make sure you buy and sell nothing but the best. Use the quality guide below to help you recognize top-grade seafood and keep substandard product from ever reaching your customers.

	Good Quality	*Poor Quality*
Fresh, Whole or Dressed Fish		
Eyes	Clear, bright, bulging; black pupil	Dull, sunken, cloudy; gray pupil
Gills	Bright-red, free of slime, clear mucus	Brown to gray, thick yellow mucus
Flesh	Firm, elastic to touch, tight to bone	Soft and flabby, separating from bone
Scales	Tightly adhered to skin, bright color, few missing	Dull, large number missing
Belly cavity	Thoroughly eviscerated and washed, no blood	Incomplete evisceration, traces of blood, cuts
Odor	Ocean fresh, slight seaweed smell	Strong "fishy," putrid or ammonia smell
Fresh Fillets/Steaks		
Color	Varies with species, but should be bright, uniform	Bruises, red spots, yellowing or browning at edges
Flesh	Cleanly cut, free of skin (if skinless), no bones, firm, moist	Ragged edges, traces of bones and skin (if skinless), soft and mushy, gaping, dried out
Odor	Ocean fresh, slight seaweed smell	Strong "fishy," putrid or ammonia smell
Shellfish		
Live crabs and lobsters	Legs move when touched; lobster tail curls under when lobster is lifted; solid weight, hard shell	No movement; lobster tail hangs limp; light weight for size; excessively soft shell (except for softshell blue crab)
Live clams, mussels, oysters, scallops	Shells tightly closed or close when tapped; shells clean, unbroken and moist; beards still on mussels; fresh scent. Neck of a softshell clam should retract when touched	Gaping shells, don't close when tapped; broken, dirty or dried-out shells; strong fishy odor
Shucked clams, mussels, oysters, scallops	Plump meats; clear liquor, no shell particles or grit; liquid less than 10 percent of volume; clean oceany smell; scallops hold their shape	Meats dried out, shriveled or discolored; excessive or cloudy liquid; shell particles and grit; sour odor
Fresh shrimp	Firm meat and no vein if P&D; translucent, moist shell; firm to touch; mild odor	Black spots (melanosis) on shell; dull, dry shells; soft flesh and traces of vein (if P&D); strong iodine odor
Surimi seafood	Snow-white or off-white meat; texture appropriate to species being imitated; firm; free of impurities; high proportion of natural fish ingredient; fresh scent	Red coloring bleeding into white meat; mushy or overly firm texture; impurities in meat; excessive liquid in package; off-color product; excessive starches and binders; sour or fermented odor
Frozen Seafood		
	Flesh is solidly frozen and glossy. When thawed, should meet same criteria as fresh	Partially thawed; white or dark spots on flesh; ice crystals or freezer burn on flesh; dry, papery edges; discoloration; tough when cooked

Finfish

Shellfish

Anchovy

Engraulis encrasicolus

French	*Anchois*
German	*Sardelle*
Italian	*Acciuga*
Japanese	*Katakuchiiwashi*
Spanish	*Anchoa*

Scientific name: *Engraulis* spp.
Market name: Anchovy
Common names: Anchovy, southern anchovy, northern anchovy, European anchovy, California anchovy, Japanese anchovy, silver anchovy, anchoveta

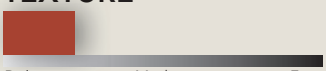
YOU SHOULD KNOW...

Fresh anchovies are uncommon, and it's hard to find unbruised, whole fish, since they are so delicate.

More than 20 different species within the Engraulidae family are marketed under the name anchovy. The U.S. Food and Drug Administration's Fish List recognizes five genus groups: *Anchoa*, *Anchoviella*, *Cetengraulis*, *Engraulis* and *Stolephorus*. The anchovy best known in culinary circles is *Engraulis encrasicolus*, the European or "true" anchovy, found in the Mediterranean, the Black Sea and warmer waters of the East Atlantic. Its North American counterpart, *E. mordax*, aka northern or California anchovy, ranges off the West Coast from Mexico to British Columbia. Silvery fish with blue-green backs, anchovies are tiny; maximum length is 8 inches. They favor warmer waters around the globe, swimming in huge schools that feed on algae and zooplankton. They are caught by deepwater trawlers, and the majority of the catch is canned, salted, turned into paste or distilled to make the Southeast Asian fish sauces like the Vietnamese nuoc mam. Anchovies are often confused with sardines, which in America are actually small herring.

FLAVOR

TEXTURE



PRODUCT PROFILE

The meat of canned anchovy packed in oil is blush red, a result of the four-month salt-curing process. The meat of unprocessed anchovy is gray; it becomes off-white when cooked.

Canned or salted anchovies have a pronounced, salty tang; fresh anchovies have a rich but subtle taste and a soft texture. The skin is edible.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	131
Fat Calories	43
Total Fat	4.8 g
Saturated Fat	1.3 g
Cholesterol	60 mg
Sodium	104 mg
Protein	20.4 g
Omega-3	1.5 g

Source: USDA

COOKING TIPS

Use fresh anchovies as you would herring. Salted or canned anchovies are commonly used as flavoring agents; do not use them in recipes calling for fresh anchovies. Before serving or using canned fillets, rinse well under cold running water or soak in cool water for 30 minutes, then drain and pat dry. Fresh anchovies are delicious grilled, but if too small to place on the barbecue, they can be sprinkled with oil and herbs and broiled. They are also good lightly pan fried or marinated as escabèche.

Substitutions Small herring, Smelts

GLOBAL SUPPLY

Africa
Chile
France
Peru
Portugal
Spain
U.K.
United States

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- ☐ Poach
- ☐ Sauté
- ☐ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole, head off

Canned
- Whole
- Gutted
- Fillets

Salted
- Whole
- Gutted
- Fillets

Smoked or dried
- Whole
- Gutted
- Fillets

Arctic char

French	*Omble chevalier*
German	*Saibling*
Italian	*Salmerino alpino*
Japanese	*Iwana*
Spanish	*Salvelino*

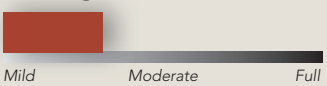
YOU SHOULD KNOW...

Most of the char on the market today comes from the Northwest Territories or even farther, so product is usually frozen. Keeping distance in mind, take care when buying fresh char. For consistent product, establish a consistent source.

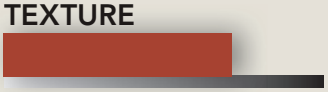
Scientific name: *Salvelinus alpinus*
Market name: Char
Common names: Arctic char, alpine trout, alpine char, sea trout

Arctic char is a member of the trout and salmon family, and it physically resembles the salmon. Its silvery skin is dappled with pink along the lateral line, and the fish sports green and blue coloration on its back and upper sides. Arctic char is also anadromous like salmon, migrating from northern lakes to saltwater to spawn. But, instead of dying afterward like its salmon cousin, the char can live for 25 years. The Inuit of Canada have enjoyed char for hundreds of years; they freeze the fish and eat them like Popsicles. Wild-harvested char come from remote, icy waters of Europe, Asia and North America. Northern Canada is the prime supplier, with Iceland close behind. These two are also the major suppliers of farmed char. The typical market size for the fish is between 2 and 8 pounds. Some farms raise pan-sized fish weighing 8 to 10 ounces. In Canada, gillnets, weirs and trap nets are used to harvest wild Arctic char.

FLAVOR



TEXTURE



PRODUCT PROFILE

Arctic char has distinctive flavor, somewhere between that of salmon and trout, but closer to trout. The meat is moderately firm but has a finer flake than either salmon or trout. A high fat content keeps it moist.

Flesh coloring ranges from deep red to pale pink. The taste is the same, regardless of the meat's color. Arctic char, like other anadromous fish, can have parasites, which are killed by proper freezing or cooking.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	154
Fat Calories	73
Total Fat	8.1 g
Saturated Fat	N/A
Cholesterol	N/A
Sodium	N/A
Protein	20.2 g
Omega-3	1.6 g

Source: *Multilingual Illustrated Guide to the World's Commercial Coldwater Fish* by Claus Frimodt, Fishing News Books, 1995. This material is reproduced with permission of John Wiley & Sons, Inc.
Photo courtesy of Icy Waters International

COOKING TIPS

Arctic char's flavor appeals to people who enjoy trout but find salmon too strongly flavored. In general, cook char as you would trout. Fillets and steaks can be broiled or cooked on the grill, while whole fish can be baked or poached. The skin becomes thick and leathery after cooking, so it's best to remove it before serving. The oil content makes char also a good candidate for smoking — use either the hot or cold method.

Substitutions Salmon, Trout

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

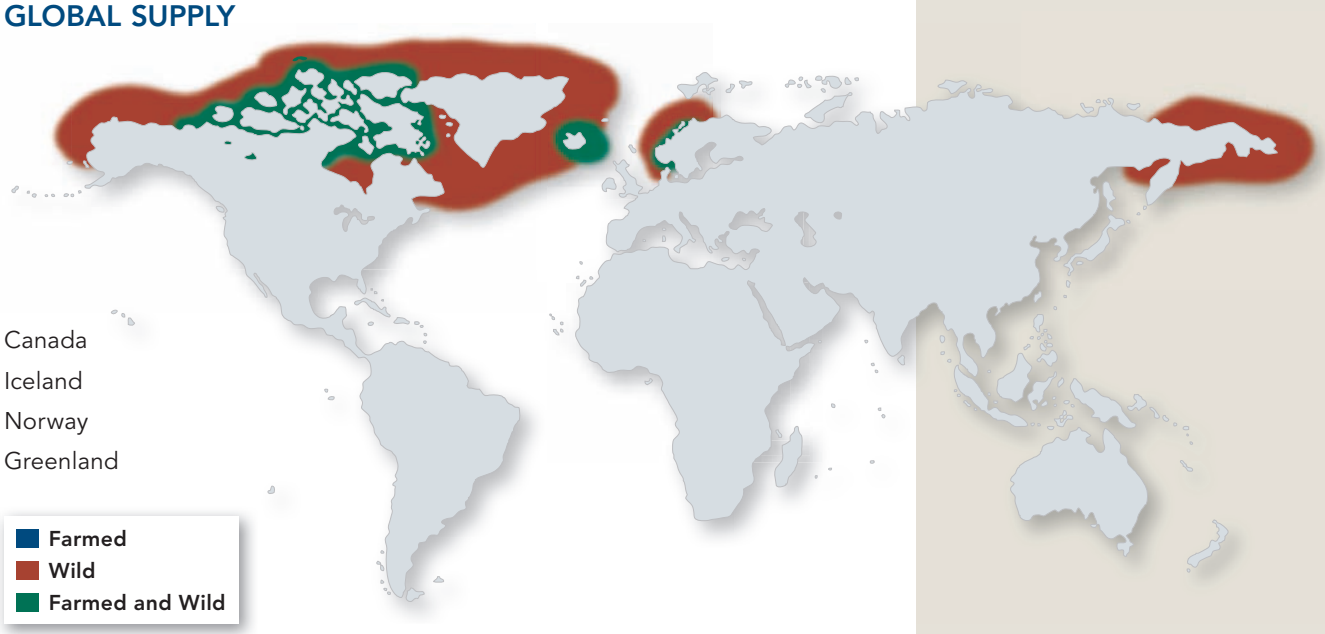
PRIMARY PRODUCT FORMS

Fresh
- Whole
- Dressed
- Fillets (boneless)

Frozen (most common)
- Whole
- Dressed
- Fillets (boneless)

Value-added
- Smoked

GLOBAL SUPPLY



Barracuda

French	*Bécune*
German	*Pfeilhecht*
Italian	*Barracuda*
Japanese	*Kamasu*
Spanish	*Barracuda*

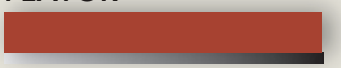
YOU SHOULD KNOW...

Buy only Pacific barracuda, as the Atlantic, or great, barracuda species can cause ciguatera poisoning.

Scientific name: *Sphyraena argentea*
Market name: Barracuda
Common names: Pacific or California barracuda

The Pacific, or California, barracuda is one of about 20 species of predatory fish in the family Sphyraenidae. It is found from Baja, California, to Kodiak Island, Alaska, but is most prevalent from Baja to Southern California. The great, or Atlantic, barracuda (*S. barracuda*) is also a commercial species, but the Pacific barracuda is the only one marketed in the United States. It is seldom bigger than 12 pounds; market size averages 3 to 6 pounds. The great barracuda can attain 100 pounds. It has little domestic market value, since great barracuda from Florida and the Caribbean have been associated with ciguatera poisoning. Properly handled Pacific barracuda poses no health threat. The fish must be bled immediately upon harvesting, or the meat will turn dark and spoil even when frozen. Rapid icing is also important to maintain quality.

FLAVOR



TEXTURE

PRODUCT PROFILE

The flesh of the barracuda is creamy tan when raw and cooks up to off-white.

Pacific barracuda meat is firm, with a large flake and moderate fat content. It has a full, meaty flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	104
Fat Calories	9.1
Total Fat	1 g
Saturated Fat	0.29 g
Cholesterol	N/A
Sodium	46 mg
Protein	22.2 g
Omega-3	0.18 g

Source: University of Florida and Florida Department of Natural Resources, Bureau of Seafood Marketing
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [ ] Sauté
- [x] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole (gilled and gutted)
- Fillets
- Steaks

Frozen

- Whole (G&G)
- Fillets
- Steaks

Smoked

COOKING TIPS

The firm-fleshed barracuda fillets and steaks hold together well during grilling or broiling, the favorite preparation methods for this fish. Steaks can be pan-fried as well. The flavor stands up to marinades and flavorful sauces. Since barracuda spoils quickly if not properly handled, keep it well chilled until ready to cook.

Substitutions Bluefish, Mackerel, Wahoo

GLOBAL SUPPLY

Mexico
United States

Barramundi

French	*Barramundi, brochet de mer*
German	*Barramundi*
Italian	*Barramundi*
Japanese	*Akame*
Spanish	*Perca gigante, barramundi*

YOU SHOULD KNOW...

Confirm product origin with your supplier; Lake Victoria perch from Africa is sometimes mislabeled as barramundi.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Lates calcarifer*
Market name: Barramundi
Common names: Barramundi perch, giant perch, palmer, cockup, bekti, nairfish, silver barramundi, Asian seabass

A relative newcomer to the U.S. seafood market, barramundi is finding a place both at high-end restaurants and mid-scale retailers, where its versatility and eco-friendly reputation have earned it a following. Australia's Aborigines dubbed this species barramundi, meaning river fish with large scales; it spends most of its life in rivers, migrating to estuaries to breed and then returning to its original river system. A member of the sea bass family, barramundi is native to Australia's northern tropical waters and parts of Southeast Asia. Farms and wild fisheries supply the growing global market. The hardy barramundi can grow to market size of 1.5 to 2 pounds in less than a year, making it well suited for aquaculture. Farming of this species started in Thailand in the 1970s and spread throughout Southeast Asia, in small, coastal cage operations. Barramundi also is raised in Australia, Malaysia, Thailand, the Philippines and Vietnam and in the United States at facilities in western Massachusetts and Florida. An Australian company is farming barramundi in open-ocean cages off the Marshall Islands. The world's biggest supplier is Indonesia, where production is mainly 5- to 10-pound barramundi from wild fisheries.

PRODUCT PROFILE

Raw flesh is pearly pink; cooked meat is white.

Barramundi has a firm, moist texture and large flakes. The fish is prized for its sweet, buttery flavor. Small barramundi are milder in flavor than larger fish. The few bones in the fish are large and easily removed.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
* Calories	108
Fat Calories	8
Total Fat	0.9 g
Saturated Fat	0.4 g
Cholesterol	45 mg
Sodium	N/A
* Protein	20.1 g
Omega-3	0.6 g

Source: *Multilingual Illustrated Guide to the World's Commercial Coldwater Fish* by Claus Frimodt, Fishing News Books, 1995. This material is reproduced with permission of John Wiley & Sons, Inc.
Fisheries Research & Development Corp., Australian Government.

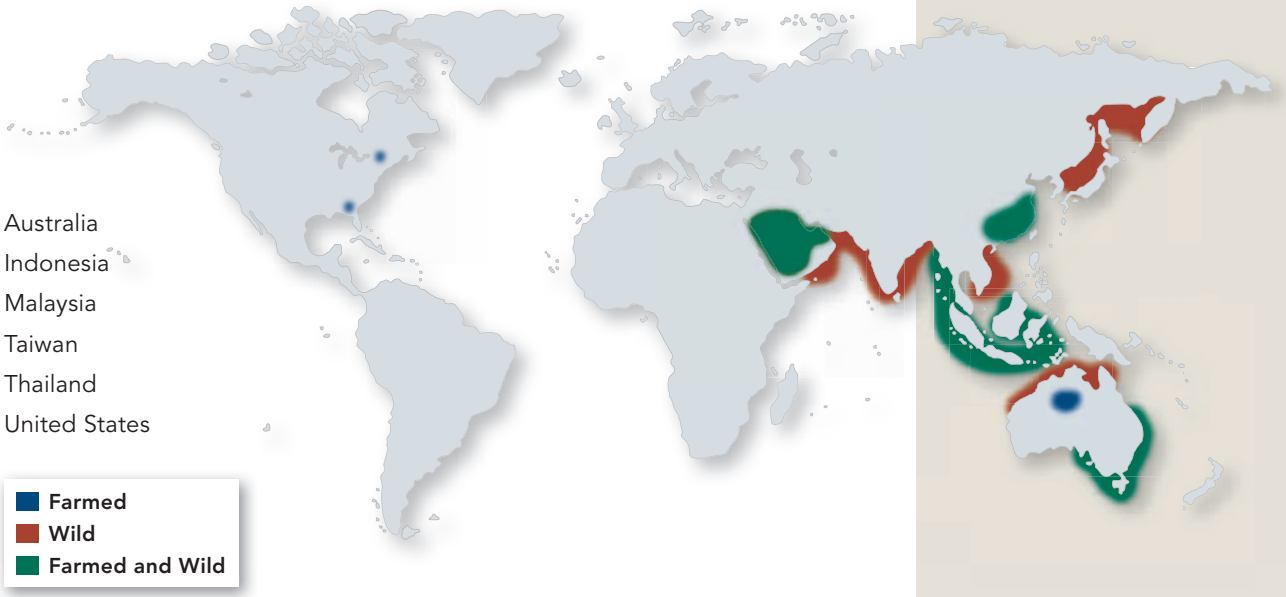
Photo courtesy of Australis Aquaculture

COOKING TIPS

Barramundi is a versatile fish and has a high enough oil content to keep the flesh moist while cooking. The sweet, mild flavor lends itself to a wide range of sauces and spices. Try grilling whole barramundi to serve with a dill-and-lemon butter sauce. The fish is also excellent pan seared with the edible skin, which crisps up nicely. Aborigines wrap barramundi in the leaves of the wild ginger plant and bake it in hot ashes for a traditional preparation.

Substitutions Striped bass, Red snapper, Grouper

GLOBAL SUPPLY



COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live (limited)

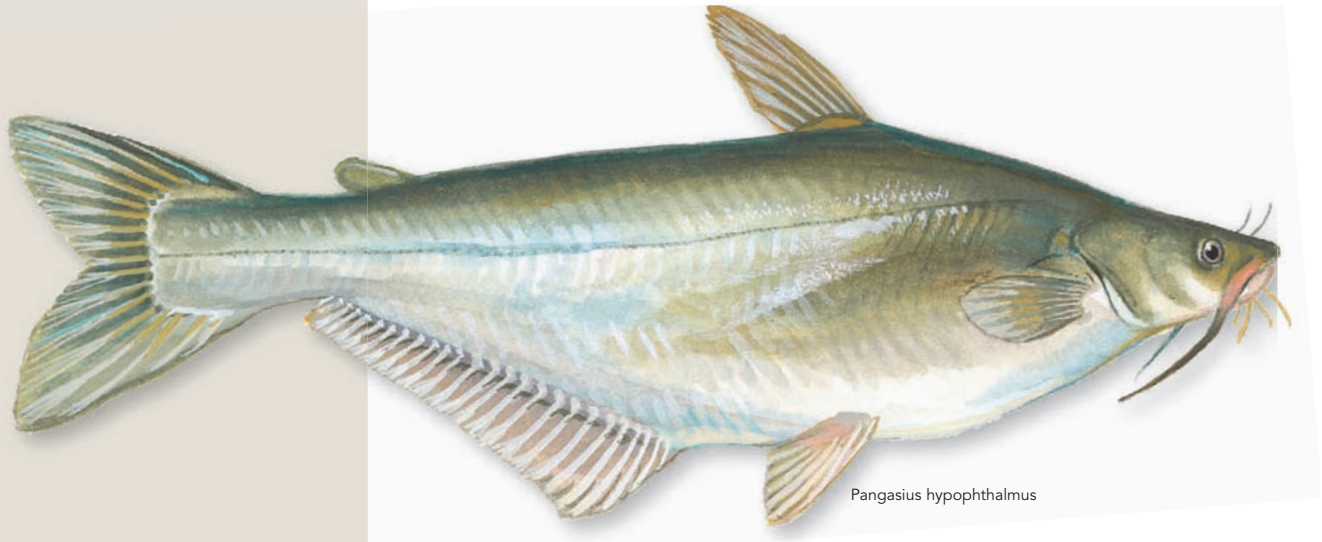
Fresh

- Whole
- Fillets

Frozen

- Whole
- Fillets

Basa/swai



Pangasius hypophthalmus

French *Poisson-chat du Mékong*
German *Haiwels*

Scientific names: *Pangasius bocourti; P. hypophthalmus*
Market names: Basa, bocourti, bocourti fish; swai
Common names: Basa, basa catfish; swai, tra, Vietnamese catfish

YOU SHOULD KNOW...

Standards can vary among Vietnamese processers, so before making any big basa buys, do some cuttings in your test kitchen with samples from a variety of packers. You may be surprised by the differences in quality and price.

When trade with Vietnam resumed in 1994, U.S. seafood importers started shipping fillets from a Vietnamese catfish called basa, or bocourti. But most of what's sold in the market today as basa isn't basa. Real basa, *P. bocourti*, is one of 21 species in the Pagasiidae family of catfish found throughout Southeast Asia. Cambodian and Vietnamese fish farmers have raised basa in cages along the Mekong River for decades. But *P. hypophthalmus*, or swai, known locally as tra, has become the preferred farmed species. Inferior to basa, but faster and cheaper to raise, swai has been marketed as China sole, river cobbler and even basa, adding to the confusion of unwary buyers. Also labeled catfish, it was eagerly accepted as a cheap alternative to the farmed U.S. species. But such labeling is no longer allowed, following a Food and Drug Administration ruling that only species from the family Ictaluridae can be sold as true catfish.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

Basa is a tasty fish, with a delicate texture and nice white flesh. The fast-flowing waters of the Mekong give the meat a clean, fresh flavor. Tra tends to be coarser and more grainy than true basa.

You can tell true basa from tra by appearance. Basa fillets are whiter than tra fillets, which are usually more of a beige color. Tra fillets are also thinner than basa fillets.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	90
Fat Calories	36
Total Fat	4 g
Saturated Fat	1.5 g
Cholesterol	45 mg
Sodium	50 mg
Protein	13 g
Omega-3	N/A

Source: Vietnam Association of Seafood Exporters and Producers

Photo: Copyright Gourmet Traveller, http://janetching.wordpress.com/:cook

COOKING TIPS

Basa is a versatile fish whose flesh is mild enough to take on other flavors but flavorful enough to hold its own in simple preparations. It remains moist during cooking. Whether to go with true basa or cheaper tra fillets depends on the application. If you want a fish you can bread and fry for a buffet line, for example, go with the less expensive tra. But if you want to showcase an exotic yet still-affordable fish, give the real basa a try.

Substitutions Channel catfish, Lake whitefish

GLOBAL SUPPLY

Vietnam

- Farmed
- Wild
- Farmed and Wild

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

Fillets (skinless/boneless)

Frozen

Fillets (skinless/boneless)

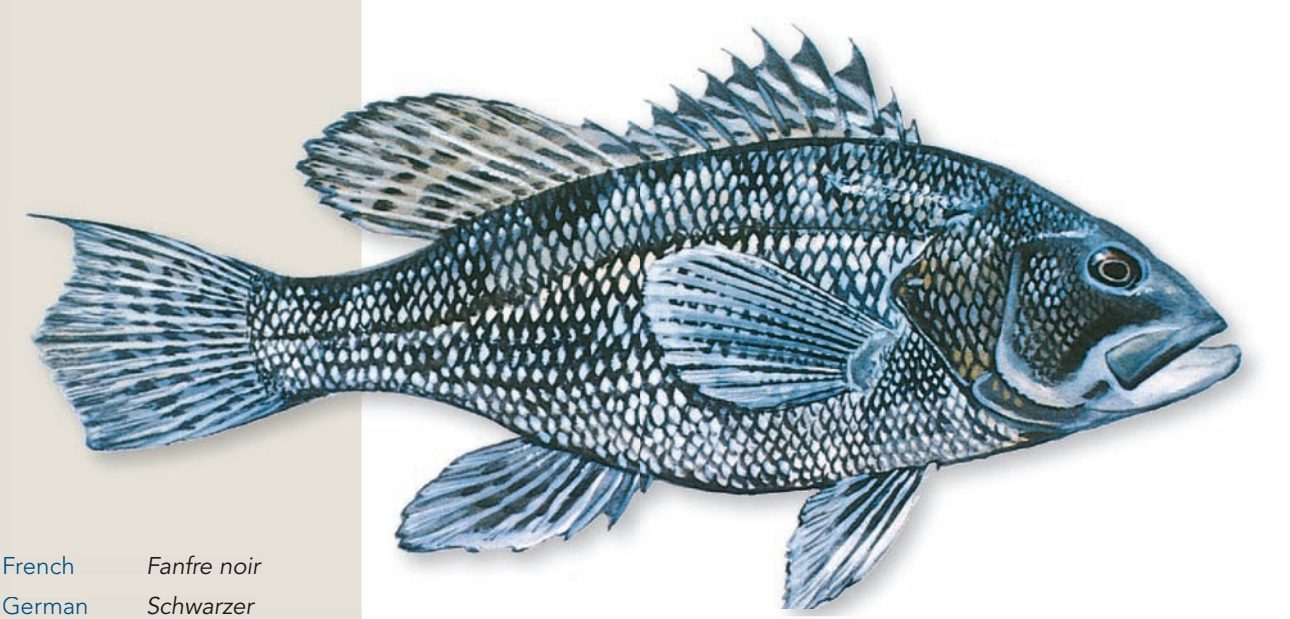
Value-added

Portions

Strips

Breaded

Bass, black sea



French	*Fanfre noir*
German	*Schwarzer Sägebarsch*
Italian	*Perchia striata*
Japanese	*Hata*
Spanish	*Serrano estriado*

YOU SHOULD KNOW...

Black sea bass is a favorite of recreational fishermen, but buying from reputable commercial dealers is strongly recommended.

Scientific name: *Centropristis striata*
Market name: Sea bass
Common names: Blackfish, rock bass, black bass, bluefish, tallywag

Black sea bass, a small, plump fish related to grouper, is one of the most important commercial bass species. These bass begin life as males and become females between the ages of 2 and 5. Attractive fish, they lend themselves to display in live tanks. Mature animals have an even pattern of white diamonds along their dark sides, which are generally smoky gray, dusky brown or bluish black. Black sea bass are found from Rhode Island to Florida and are caught by trawl nets, longlines, hand lines and fish traps. Hooked fish offers best quality, followed by trapped. Sea bass can grow to about 8 pounds, but most are harvested at 1 1/2 to 3 pounds and shipped live to ethnic markets in the United States and Canada. Some fish dealers report that black sea bass remain odor-free longer than other species. Many fish on the market have the word *bass* in their name. Black sea bass is often confused with striped bass or tautog, which is also called blackfish.

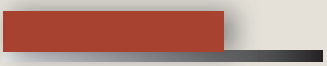
PRODUCT PROFILE

Black sea bass has a mild, fresh, somewhat delicate flavor and a tender but firm texture. Uncooked flesh should be sparkling white and translucent, not opaque. The firm, lean meat cooks up snow white. Be careful handling whole fish; a jab from the dorsal-fin spines can be very painful.

These fish are notably hardy and hold up well as a live product. They also offer excellent shelf life fresh. It is typically frozen only when demand is low or the market is glutted.

FLAVOR

TEXTURE



NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixeds species)

AMOUNT PER SERVING	
Calories	97
Fat Calories	18
Total Fat	2.0 g
Saturated Fat	0.5 g
Cholesterol	41 mg
Sodium	68 mg
Protein	18.4 g
Omega-3	0.7 g

Source: USDA
Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

COOKING TIPS

One of the best small fish to bake or grill whole, due to its relatively simple bone structure, black sea bass is frequently used in Chinese cooking. Try it with a ginger-and-soy-sauce dip. The flesh holds together well and can be used in chowders and soups. The skin is very attractive, so don't hesitate to display it when serving.

Substitutions Dogfish, Grouper, Rockfish

PRIMARY PRODUCT FORMS

Live

Fresh (most common)

- Whole
- Dressed (head-on)
- H&G
- Fillets

Frozen

- Whole
- Dressed (head-on)
- H&G
- Fillets

GLOBAL SUPPLY

Bass, Chilean sea

French	*Légine australe*
German	*Schwarzer Seehecht*
Italian	*Merluzzo nero*
Japanese	*Ookuchi*
Spanish	*Austromerluza negra*

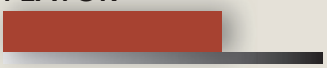
YOU SHOULD KNOW...

Be cautious of an enzyme-caused "jellying" that affects the flesh of some sea bass. The only way to find out if your fish have this problem is to fillet them.

Scientific name: *Dissostichus eleginoides*
Market name: Patagonian toothfish
Common names: Patagonian toothfish, Antarctic cod, icefish

Chilean sea bass are not really bass but Patagonian toothfish, a large, slow-growing species first harvested in the early 1980s by Chilean longliners working the continental shelf in depths of 5,000 to 6,000 feet. Chilean sea bass is a member of the Nototheniidae family. In Chile, the fish is also called *mero*, *merluza negra* and *bacalao de profundidad* ("cod of the deep"). The fish was first harvested off the southern coast of Chile, almost to the Antarctic. The grounds have been extended to much of the Southern Hemisphere. It's a big fish; headed-and-gutted Chilean sea bass have weighed in at 100 pounds, but average market weight is closer to 20 pounds. The fish is marketed in frozen form; "fresh" sea bass is nearly always "refreshed" product (frozen fish that has been thawed). However, since Chilean sea bass is generally frozen at sea, it's a superior product even when sold as "previously frozen." Sea bass from South America tend to be bigger than their South African counterparts.

FLAVOR



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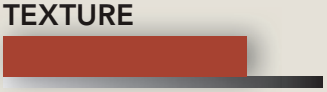


PRODUCT PROFILE

Chilean sea bass has a rich, melt-in-your-mouth flavor. The moderately oily meat is tender and moist with large, thick flakes. Meat from raw Chilean sea bass is snow white. When cooked, the meat remains white, comparable in appearance to cod.

Refreshed fillets should be shiny and resilient. Frozen product shouldn't have freezer burn or discoloration.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	184
Fat Calories	130
Total Fat	14.2 g
Saturated Fat	3.2 g
Cholesterol	49 mg
Sodium	56 mg
Protein	13.2 g
Omega-3	1.3 g

Source: www.alwaysfreshfish.com
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- ■ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh (usually "refreshed")

- H&G
- Loins
- Fillets (skinless)

Frozen (most common)

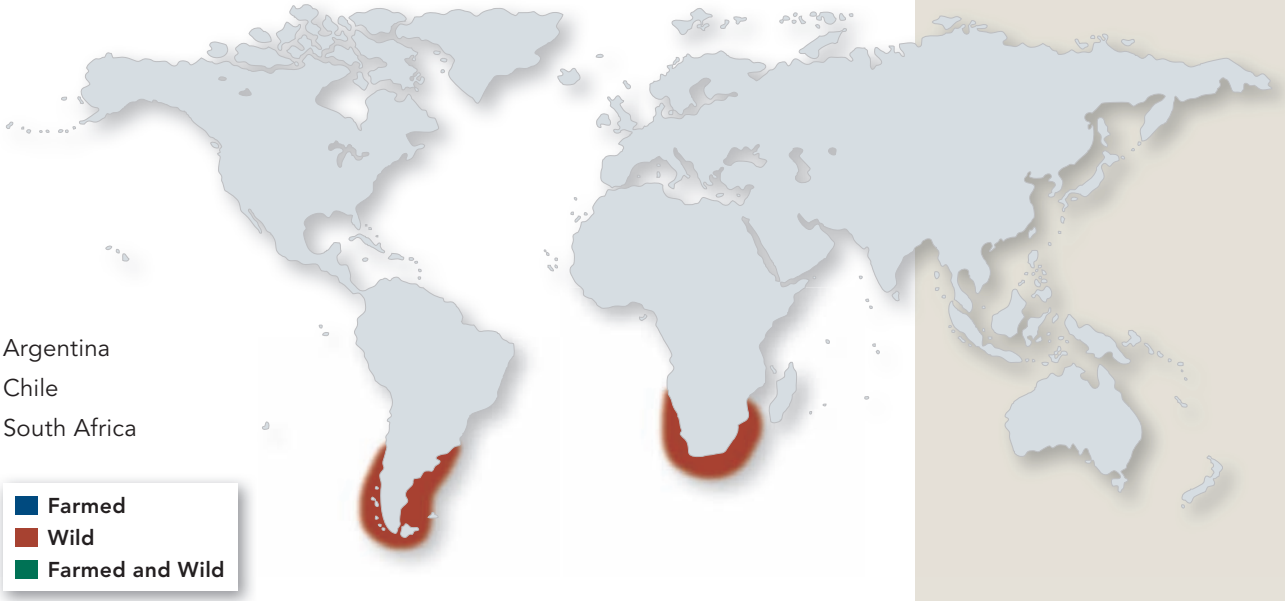
- H&G
- Fillets (skinless)

COOKING TIPS

Chilean sea bass is an excellent fish for grilling, but the skinless fillets must be handled carefully so they don't fall apart while cooking. You can also poach or sauté the meat, but avoid heavy sauces that compete with the fish's own full flavor. Because of its high oil content, Chilean sea bass also lends itself to smoking. The same characteristic makes it unsuitable for frying.

Substitutions Sablefish, Black sea bass

GLOBAL SUPPLY



Bass, European sea

French	*Bar, loup de mer*
German	*Wolfbarsch*
Italian	*Spigola*
Japanese	*Hata*
Spanish	*Lubina*

Scientific name: *Dicentrarchus labrax*
Market name: Sea bass
Common names: European sea bass, Mediterranean sea bass, branzino, bar, loup de mer

YOU SHOULD KNOW...

The French name for European sea bass is loup de mer, meaning sea wolf; don't confuse it with North Atlantic wolffish.

Sea bass, often marketed by U.S. chefs under the Italian name branzino, is a prized fish in Europe, where it is largely a recreational catch. Small commercial fisheries exist in the Mediterranean. The gear used to catch these bass includes beach and purse seines, trawl nets, trammel nets, longlines and rod and line. Commercial catches are sold fresh, mainly to local markets. This sea bass, which reaches a maximum size of around 32 inches, is found in the Atlantic along the European coasts, in the Mediterranean and as far south as Senegal. Limited wild harvests and a high price made U.S. imports unfeasible until farmed supplies from Norway and Greece began appearing in the American market. Demand today is met almost exclusively by aquacultured product. The bass's ability to thrive in seawater, brackish water and even fresh water makes it a good candidate for farming. Though now classified as *Dicentrarchus labrax*, branzino has also gone by the scientific name *Morone labrax*.

PRODUCT PROFILE

European sea bass meat is pinkish when raw and cooks up opaque white.

The finely textured, flaky meat is lean, with a sweet and mild flavor. Many chefs say the wild-caught bass is more flavorful than the farmed product.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (Sea bass, mixed species, raw)

AMOUNT PER SERVING	
Calories	97
Fat Calories	18
Total Fat	2.0 g
Saturated Fat	0.51 g
Cholesterol	41 mg
Sodium	68 mg
Protein	19.3 g
Omega-3	0.7 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

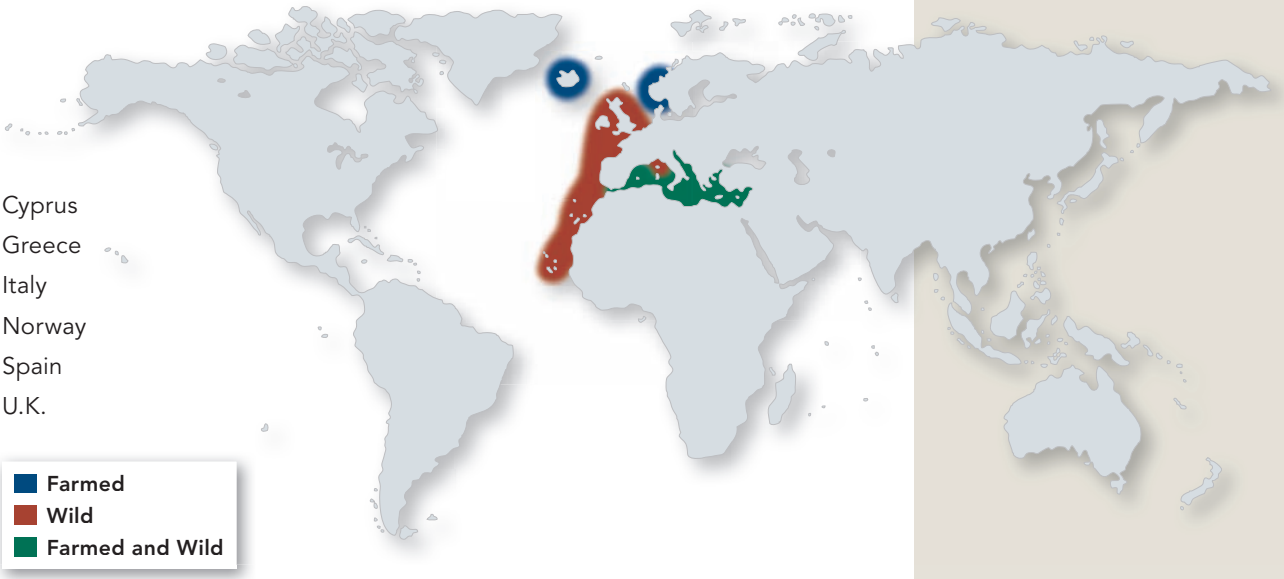
- Whole (most common)
- Gutted
- Fillets

COOKING TIPS

Since branzino has a relatively low fat content, it is best steamed, baked or sautéed, as these preparations let the delicate flavor come through. Mediterranean cooks grill branzino, but this is tricky as the flesh can dry out easily.

Substitutions Black sea bass, Perch, Whitefish

GLOBAL SUPPLY



Bass, hybrid striped

French	*Bar d'Amérique*
German	*Felsenbarsch*
Italian	*Persicospigola striata*
Japanese	*Suzuki*
Spanish	*Lubina americana*

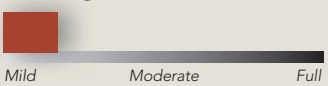
YOU SHOULD KNOW...

Skin-on fillets provide a good means of product identification as well as an attractive appearance. The unique broken-line pattern of dark stripes along either side distinguishes the hybrid from wild striped bass.

Scientific name: *Morone chrysops* x *M. saxatilis*
Market name: Bass
Common names: Sunshine bass, white bass, hybrid striped bass

After the wild striped bass stocks nearly collapsed, the aquaculture industry responded by engineering this hybrid. The new species was established in 1967 by crossing the anadromous wild striper (*Morone saxatilus*) with white bass (*M. chrysops*), a fish that lives in both estuarine and fresh water. The result combines the attractive appearance and edibility of the wild striped bass with the hardier, faster-growing characteristic of the white bass. The hybrid also offers a greater yield than its wild parents. Farmed striped bass reach 5 pounds but are usually marketed at 1 to 3 pounds. The fish are grown in ponds, tanks and cages at more than 50 farms in the United States, but farms in the western region account for half the national production. Hybrid striped bass can be harvested, chilled, graded, sorted and shipped to market within 24 hours, ensuring freshness and quality. High production costs relegate hybrid striped bass to a niche market.

FLAVOR



TEXTURE

PRODUCT PROFILE

Striped bass is a mild fish with a delicate, slightly sweet flavor that appeals to a wider range of consumers than traditional, wild-run striped bass, which has a more pronounced taste and a coarser texture. The raw meat is translucent white with a pinkish cast; it turns opaque white when cooked. It is moderately firm but flaky, and the oil content keeps it moist during cooking.

Most hybrid striped bass are raised in oxygenated tanks or ponds, where strict control of water quality and feed ensures consistent flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	97
Fat Calories	21
Total Fat	2.3 g
Saturated Fat	0.5 g
Cholesterol	80 mg
Sodium	69 mg
Protein	17.7 g
Omega-3	0.8 g

Source: USDA
Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING TIPS

Striped bass can be stuffed and baked whole (headed and gutted). When grilling the fish, leave the skin on. It has a delicate flavor and turns nice and crispy while the flesh remains moist.

Substitutions Catfish, Black sea bass, Lake Victoria perch

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- □ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Whole
- Dressed
- H&G
- Fillets (skin-on/skinless)

GLOBAL SUPPLY

Bluefish

French	*Tassergal*
German	*Blaufisch*
Italian	*Pesce serra*
Japanese	*Amikiri*
Spanish	*Anjora*

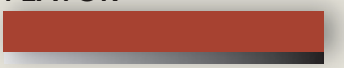
YOU SHOULD KNOW...

Scombroid poisoning has been associated with bluefish left out in warm temperatures. Large blues may also contain high levels of PCBs (polychlorinated biphenyls).

Scientific name: *Pomatomus saltatrix*
Market name: Bluefish
Common names: Bluefish, snapper, tailor

Bluefish are voracious feeders and fierce fighters, earning them the name "chopper" among fishermen. Blues can weigh up to 30 pounds; fish bigger than 10 pounds are called "horses," while youngsters of 1 to 2 pounds are known as "snappers." Average market size is 3 to 5 pounds. Bluefish travel up and down the eastern seaboard from Maine to Florida, following schools of small, oil-rich menhaden, a favored food. This diet of pogies gives older blues their pronounced flavor. Younger bluefish eat crustaceans, resulting in a sweeter and milder flesh. Main bluefish producers are the Chesapeake Bay area, New Jersey and Long Island, and North Carolina has a significant winter fishery. Bluefish deteriorates rapidly if not immediately iced, and it doesn't freeze well. That's why the fish is seldom seen far from where it's landed unless flown in by a restaurant as a special. So buy in season and handle with care.

FLAVOR



TEXTURE

PRODUCT PROFILE

The meat of uncooked bluefish ranges from a light putty color to blue-gray with a brownish tinge. It becomes lighter when cooked. A strong-flavored, dark strip of meat on the fillet may be removed before cooking.

Bluefish has a rich, full flavor and coarse, moist meat with edible skin. The larger the fish, the more pronounced the taste.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	124
Fat Calories	38
Total Fat	4.2 g
Saturated Fat	0.9 g
Cholesterol	59 mg
Sodium	60 mg
Protein	20 g
Omega-3	0.83 g

Source: USDA

Photo by Robyn Lee, © 2007

COOKING TIPS

Plan to cook bluefish within a day of purchase. True fish lovers appreciate the rich, strong flavor of blues, which can be nicely complemented by acidic ingredients like lime and lemon juice or tomato. For an easy entrée, simply brush a fillet with mustard or mayonnaise and broil it. Bluefish also can be grilled, roasted or baked. Only small bluefish can be fried, since larger fish are too oily. Large fish can be baked whole.

Substitutions Mackerel, Mullet, Wahoo

GLOBAL SUPPLY

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [ ] Poach
- [ ] Sauté
- [x] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh (raw)

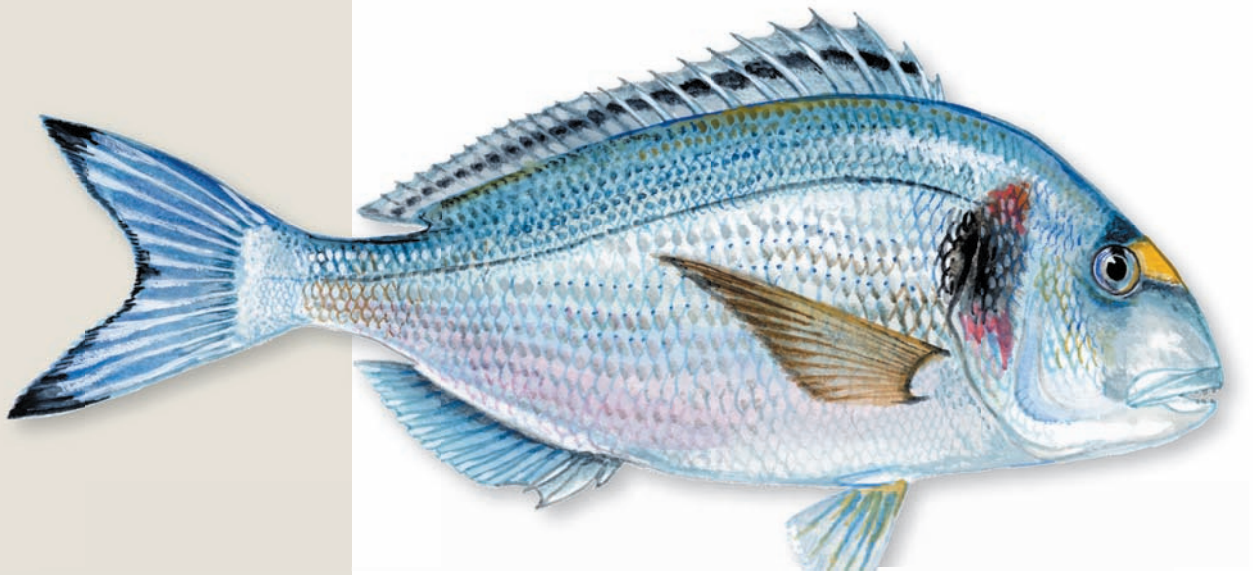
Whole, head on, dressed

Fillets, skin-on

Smoked

Pâté

Bream



French	*Dorade*
German	*Goldbrassen*
Italian	*Orata*
Spanish	*Dorada*

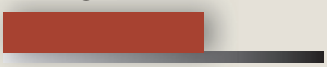
YOU SHOULD KNOW...

A lesser bream, *Pagellus bogaraveo*, or red bream, is known by the French name *dorade communue*; don't confuse it with the superior *daurade royale*, *Sparus auratus*.

Scientific name: *Sparus auratus*
Market name: Bream
Common names: Gilt-head bream, sea bream, daurade, daurade royale, orata

This high-valued species is the favored sea bream, prized in Mediterranean cuisine and highly regarded by European chefs. It gets the "gilt-head" name from the golden stripe between its eyes. The Romans reportedly called the bream "Aurata," the gilded one. The Greek goddess Aphrodite also considered the gilt-head bream sacred. The fish reach maturity during their second year, up to which time they are male. In the third year, for reasons not fully understood, they become female. Sea bream are found in the Atlantic and Mediterranean, but commercial harvests are small. As with European sea bass, bream is increasingly supplied by aquaculture operations, mostly in the Mediterranean. Some is also raised in Iceland in geothermic water. A small member of the porgy family, Sparidae, sea bream usually run 10 to 14 inches long and between 1 1/4 and 6 pounds. Upscale chefs in the United States menu bream by its French name, *daurade*, or *daurade royale*.

FLAVOR



TEXTURE

PRODUCT PROFILE

The rosy-colored raw meat turns white when cooked. Bream's moist flesh has a rich, sweet flavor. The texture is firm but tender.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	96
Fat Calories	17
Total Fat	1.9 g
Saturated Fat	N/A
Cholesterol	N/A
Sodium	N/A
Protein	19.7 g
Omega-3	0.4 g

Source: *Multilingual Illustrated Guide to the World's Commercial Coldwater Fish* by Claus Frimodt, Fishing News Books, 1995. This material is reproduced with permission of John Wiley & Sons, Inc.
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Daurade is best cooked whole, dressed but with the backbone left in. Because the flesh holds together well, it can be braised and used in stews. It is the fish traditionally featured in bouillabaisse. The fish is excellent poached in wine. It can also be stuffed and baked, grilled or sautéed.

Substitutions Black sea bass, Red snapper

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole (most common)
- Gutted
- Fillets

Carp

French	*Carpe*
German	*Karpfen*
Italian	*Carpa*
Japanese	*Koi*
Spanish	*Carpa*

Scientific name: *Cyprinus carpio*
Market name: Carp
Common names: Common carp, German carp, European carp, mirror carp, leather carp, koi

YOU SHOULD KNOW...

Carp can develop an earthy flavor, which is often more pronounced during the warm season. For best taste, buy fish harvested from cold water.

Sustainability is certainly not an issue with the common carp, which is farmed and fished in freshwater worldwide. Native to Asia, the species eventually made its way into Europe and was introduced in the 1800s to the United States, where it's now considered an invasive species. Processing entrepreneurs in the Midwest are working to expand the market — and fishing effort — for the fish, which is in demand in restaurants and shops in urban Asian communities. The hardy carp was one of the world's original farmed fish, raised as early as 500 B.C. in China, which still accounts for the lion's share of farmed production. While not widely consumed in this country, the fish is popular in Asia and Europe, home to many strains of common carps. The main varieties include:

- Leather carp, which was bred to have no scales
- Mirror carp, which has scales only near the fins
- The fully scaled common carp

Market size for whole carp ranges from 2 to 3 pounds, though they can reach more than 50 pounds.

PRODUCT PROFILE

Carp meat is white but has a strip of tough, fatty dark meat running through it. When using fillets, the dark meat can be removed before cooking for a more appetizing finished preparation.

The flesh is meaty and firm, with moderate oil content and a mild flavor. As with all farmed fish, the quality of the water in which the carp was raised determines the taste.

FLAVOR

TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	127
Fat Calories	50.4
Total Fat	5.6 g
Saturated Fat	1.08 g
Cholesterol	66 mg
Sodium	49 mg
Protein	17.8 g
Omega-3	0.43 g

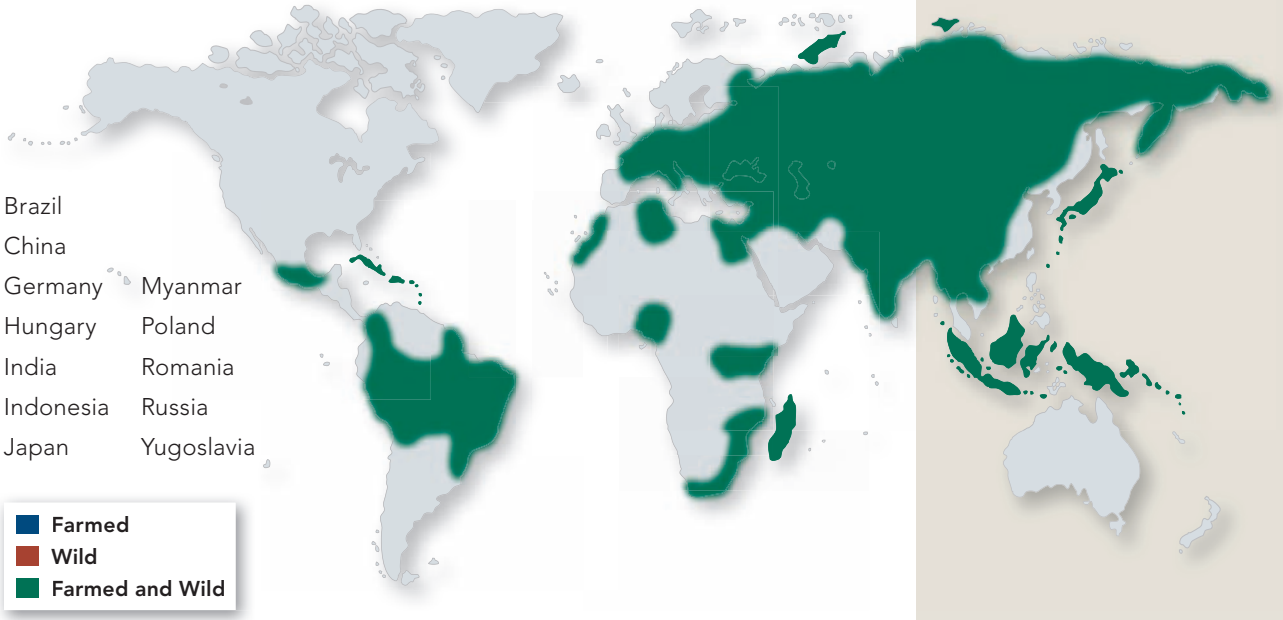
Source: USDA
Photo and work by Jennifer King

COOKING TIPS

Carp is traditionally used in making gefilte fish, in which grinding and long cooking renders the many bones in the meat less of a problem. If you're working with a full-scaled carp variety, know that the scales are difficult to remove, so this is best done before purchasing. Also, the tough skin is often removed before cooking. Carp is popular in Asian cuisine. It can be baked, pickled, smoked, steamed, fried or used in chowder.

Substitutions Striped bass, Catfish, Tilapia

GLOBAL SUPPLY



COOKING METHODS

- ■ Bake
- □ Broil
- ■ Fry
- □ Grill
- ■ Poach
- □ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

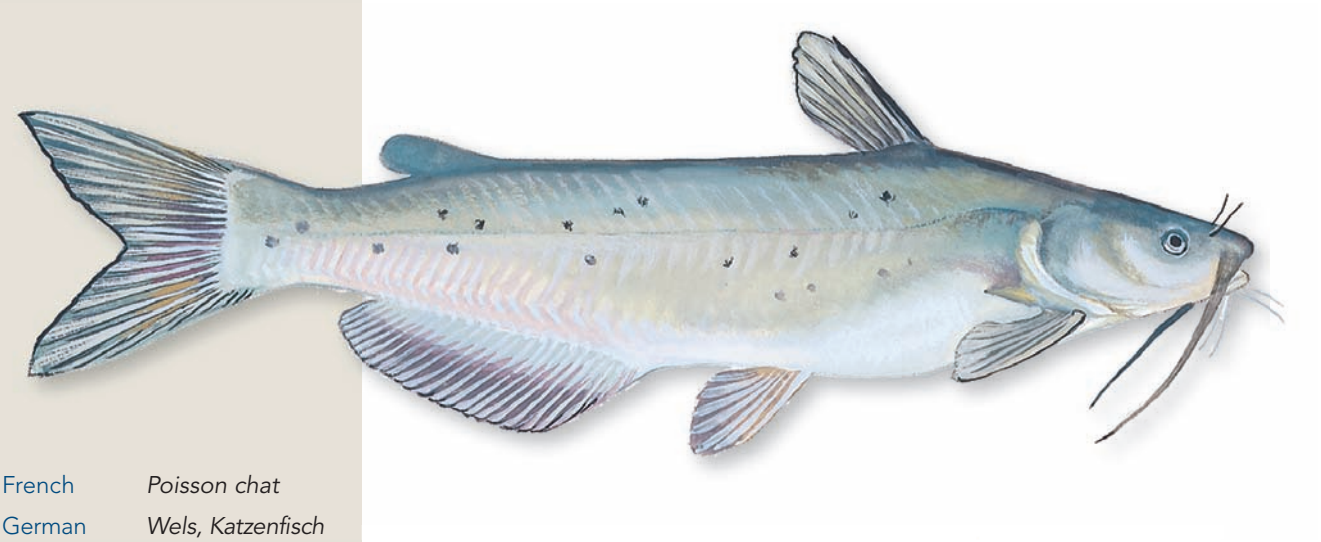
Live

Fresh
- Whole, gutted
- Headless
- Fillets
- Steaks

Frozen
- Whole, gutted
- Headless
- Minced

Value-added
- Salted roe
- Gefilte fish

Catfish



French	*Poisson chat*
German	*Wels, Katzenfisch*
Italian	*Pesce gatto*
Japanese	*Namazu*
Spanish	*Lobo*

YOU SHOULD KNOW...

Quality can fluctuate with water conditions and feed sources. Watch out for "specials" that might feature wild, river-caught catfish. And don't mistake ocean catfish, or wolffish, for farmed channel catfish.

Scientific name: *Ictalurus punctatus*
Market name: Catfish
Common names: Channel catfish, channel cat, farm-raised catfish

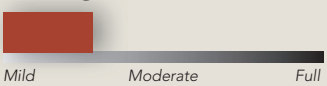
Farming catfish is truly a U.S. seafood industry success story. It started in Arkansas in the 1960s and expanded into an economic powerhouse as Southern soybean and rice farmers built ponds and processing facilities. Most catfish farms today are located in the Mississippi Delta, with additional production in Alabama, Arkansas and Louisiana. A typical pond is 16 acres and produces 4,000 to 7,000 pounds of catfish per acre. The channel cat is possibly the fastest-growing catfish species in the world. And it's one of the best protein converters: 1 pound of catfish for every 2 pounds of feed (compared to 7:1 for beef and 4:1 for pork). At market size (1 to 1 1/2 pounds), catfish are harvested and then transported live in tank trucks from the farms to processing plants, where they are processed immediately. Catfish is one of the most quality-controlled products in the food industry, and its farming is regulated by the Food and Drug Administration.

PRODUCT PROFILE

Because it's a grain-fed, farmed fish, catfish has a consistently sweet, mild taste. It absorbs other flavors readily. The moist, dense meat is firm and has less flake than the typical whitefish.

Fresh catfish meat is white to off-white, sometimes pinkish, with noticeable translucency and iridescence. Cooked meat is opaque and white. Don't buy it if it is reddish or slightly yellow. Also, don't expect it to have the oceany odor of marine fish; uncooked catfish smells almost like raw chicken.

FLAVOR



TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	135
Fat Calories	68
Total Fat	7.6 g
Saturated Fat	1.8 g
Cholesterol	47 mg
Sodium	53 mg
Protein	15.5 g
Omega-3	0.4 g

Source: USDA
Photo courtesy of The Catfish Institute

COOKING TIPS

With a fairly mild flavor and an unusual texture, catfish is as versatile as chicken; dress it up with a complex sauce, or dress it down for an outdoor barbeque. Sauce or season with a range of flavorings, from mild to strong; channel catfish can handle them all. For the classic catfish dish, dust fillets with corn meal and fry in vegetable oil; serve with hush puppies.

Substitutions Grouper, Sea bass, Rockfish

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- H&G
- Fillets (skinless/boneless)
- Strips, nuggets
- Steaks

Frozen
- Whole
- H&G
- Fillets (skinless/boneless)
- Strips, nuggets
- Steaks

Value-added
- Breaded fillets, strips, nuggets
- Marinated or seasoned fillets, strips nuggets
- Prepared entrées

Cobia

French	*Cabilo, Mafou*
German	*Offiziersfisch*
Italian	*Eglefino*
Japanese	*Sugi*
Spanish	*Bonito, cobie, pejepalo*

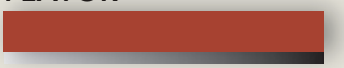
YOU SHOULD KNOW...

Because feed and environment are controlled, farmed cobia don't pose the methylmercury hazard of their wild counterparts.

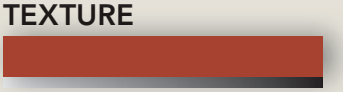
Scientific name: *Rachycentron canadum*
Market name: Cobia
Common names: Cobia, crabeater, cubby yew, cabio, bonito, sergeantfish

Cobia is a relative newcomer to the U.S. market, with limited distribution from a handful of aquaculture operations. However, proponents of cobia farming believe it could be the next tilapia, though with more character and upscale appeal. The species is a proven candidate for aquaculture, as it adapts well to a farm environment and reaches market size of around 11 pounds in less than a year. Limited availability from the wild is also sparking interest in aquaculture; cobia are not targeted by commercial fishermen and are landed just as bycatch. In the wild, cobia can reach more than 6 feet and 150 pounds and are a popular gamefish. They are found worldwide in tropical, subtropical and temperate waters, except the eastern Pacific. China is the leading producer of farmed cobia. Farmed production elsewhere is in a developmental stage, but global production is expected to expand in the future. A U.S. freshwater facility in Virginia is marketing farmed cobia, and ocean-cage operations are under way in Puerto Rico, the Bahamas, Vietnam and Central America.

FLAVOR



TEXTURE



PRODUCT PROFILE

Raw cobia meat is light tan. Cooked, it turns snowy white.

The sweet, richly flavored meat is firm with a nice flake. The oil content is similar to that of coho salmon, making for moist flesh. Cobia skin is very tough and covered with tiny scales.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	87
Fat Calories	6
Total Fat	0.64 g
Saturated Fat	0.12 g
Cholesterol	40 mg
Sodium	135 mg
Protein	19 g
Omega-3	N/A

Source: NOAA FishWatch

Photo courtesy of Aquagold Seafood Co. LLC

COOKING TIPS

Grilled, broiled or sautéed fillets are typical presentations for cobia, though the meat also can be served raw as sashimi or sushi. The firm, moist flesh lends itself especially well to grilling and takes well to marinades and bold sauces.

Substitutions Sturgeon, Chilean sea bass, Swordfish

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

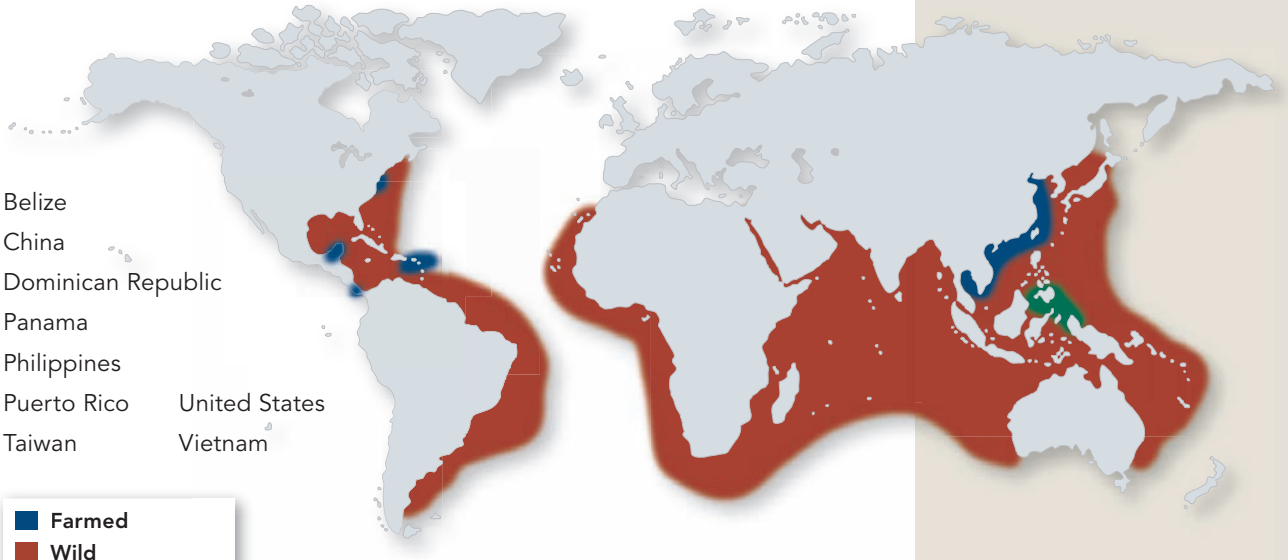
PRIMARY PRODUCT FORMS

Fresh

- Whole/gutted, headless
- Fillets

GLOBAL SUPPLY

Belize
China
Dominican Republic
Panama
Philippines
Puerto Rico
Taiwan
United States
Vietnam



Cod

Gadus morhua

French	*Morue*
German	*Kabeljau*
Italian	*Merluzzo*
Japanese	*Tara*
Spanish	*Bacalao*

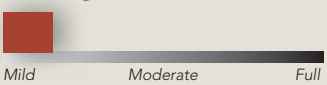
YOU SHOULD KNOW...

Cod is subject to infection with a small roundworm, or nematode, normally removed during processing. It is destroyed by proper cooking or freezing.

Scientific names: *Gadus morhua; G. macrocephalus*
Market names: Cod; cod or Alaska cod
Common names: Atlantic cod; Pacific cod (or P-cod), true cod, gray cod

Cod, considered the "default setting from which all other fish species vary," belongs to the Gadidae family, also comprising haddock, pollock, hake and hoki. Cod sports a distinctive barbel beneath its chin; at its other end is a broom-shaped tail. Atlantic cod is harvested with bottom trawls, gillnets, longlines and hook and line on both sides of the North Atlantic. Market size is 2 1/2 to 10 pounds. Large cod weigh 10 to 25 pounds; jumbos are 25 and over. The term scrod generally refers to cod under 2 1/2 pounds. Atlantic cod's smaller, paler counterpart, Pacific cod, averages 5 to 10 pounds. It is taken by trawls, longlines and pots. The Bering and Barents seas and Gulf of Alaska are major fishing grounds. The two cod species are often not separately distinguished in the marketplace but offered simply as "cod." The fish is found in various forms around the globe. Salted cod is widely used throughout the Mediterranean, Caribbean and Africa. Canada and Norway are major producers of salt cod. Norway has also had success in commercially farming cod.

FLAVOR



TEXTURE

PRODUCT PROFILE

Atlantic cod fillets have a silvery, subcutaneous layer that distinguishes them from Pacific cod. The lean meat has a mild, clean flavor and large, tender flakes. It's less firm than haddock and sweeter than Pacific cod. Raw Atlantic cod is translucent, ranging from white to pinkish. Cooked, it's an opaque white.

Raw Pacific cod is opaque, creamy white. Cooked meat is white, tender-firm, lean and flaky, with a mild taste. The moisture content is a little higher than that of Atlantic cod, making it less firm.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, Atlantic cod)

AMOUNT PER SERVING	
Calories	82
Fat Calories	6.0
Total Fat	0.7 g
Saturated Fat	0.1 g
Cholesterol	43 mg
Sodium	54 mg
Protein	17.8 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING TIPS

Use Atlantic and Pacific cod interchangeably, though Pacific cod produces larger, thicker fillets, and its moisture content makes breading difficult. Because it is so lean, cod cooks quickly and benefits from moist heat. The neutral flavor makes an excellent showcase for herbal accents like tarragon, dill and cilantro. Cod tongues and cheeks are a delicious treat if you can find them, especially sautéed.

Substitutions Haddock, Pollock, Hoki

GLOBAL SUPPLY

Iceland
Canada
Korea
Norway
Russia
UK
United States

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh
- Dressed
- H&G
- Fillets (skin-on/skinless)
- Loins
- Steaks
- Cheeks, tongue

Frozen
- Dressed
- H&G
- Fillets (skin-on/skinless)
- Loins
- Tails
- Blocks

Value-added
- Breaded/battered portions
- Entrées
- Smoked
- Dried/salted

Croaker

French	*Tambour*
German	*Atlantischer Adlerfisch*
Japanese	*Nibe*
Spanish	*Corbina*

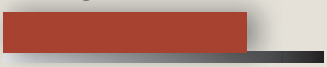
YOU SHOULD KNOW...

Atlantic croaker shouldn't be eaten raw because it may have parasites harmful to humans. Proper cooking kills the parasites.

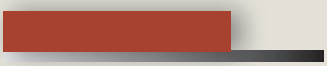
Scientific name: *Micropogonius undulatus*
Market name: Croaker
Common names: Croaker, Atlantic croaker, hardhead

The Atlantic croaker is the smallest member of the Sciaenidae family of drums. The species gets its name from the croaking sound it makes from the voluntary contraction of muscles attached to the air bladder, which acts like a resonance chamber. It's unclear whether the croaking is a form of communication within a school of fish, a means of depth sounding or a mating expression, but croakers tend to make the sound most often during breeding season. Though some 3- to 5-pound croakers are available, market size is 3/4 to 1 1/2 pounds. Atlantic croaker is found in the Atlantic and Gulf, from Cape Cod to Texas. The Chesapeake Bay region and Mississippi Delta are particularly productive areas. Croakers are caught with gillnets, pound nets and fish traps. In parts of the Gulf, Atlantic croaker is a bycatch of shrimp trawlers.

FLAVOR



TEXTURE



PRODUCT PROFILE

Raw croaker meat is usually snow white but may have a reddish tint. The cooked meat is white.

Croaker is lean and full flavored, with an almost sweet taste. The flesh is firm, similar to that of black drum. The skin is edible.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	104
Fat Calories	29
Total Fat	3.2 g
Saturated Fat	1.1 g
Cholesterol	61 mg
Sodium	56 mg
Protein	17.8 g
Omega-3	0.3 g

Source: USDA

Photo courtesy of Virginia Marine Products Board

COOKING TIPS

A popular pan fish, croaker is often breaded or dusted with cornmeal or flour and pan-fried. It can also be marinated and grilled or sautéed, roasted and broiled. For a Southern favorite, dip a dressed, scaled croaker in water, milk, egg or a combination of the three, then roll in corn flour and cook in hot grease. The meaty fish also can be steamed whole.

Substitutions Porgy, Mullet, Whiting

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh (most common)

- Whole, head off
- Steaks
- Fillets

Value-added

- Breaded portions

GLOBAL SUPPLY

Cusk

French	*Brosme*
German	*Lumb*
Italian	*Brosmio*
Spanish	*Brosmio*

YOU SHOULD KNOW...

While many lesser fish are marketed as cod substitutes, cusk is a truly worthwhile stand-in; buy it when you get the chance.

Scientific name: *Brosme brosme*
Market name: Cusk
Common names: Tusk, torsk, European cusk, brosmius

Though regarded as a substitute for cod, many chefs, including James Beard, have argued that "cusk ought to be more popular in its own right." A member of the Gadidae family, along with cod, haddock and pollock, cusk resembles its relatives through the head, but the rest of its body looks as if it was crossed with an eel. The fish is found along the western Atlantic from Newfoundland to Cape Cod. On the European side, it is caught from northern Scotland to Iceland and northern Norway. Cusk is a bottom-feeding fish, found as deep as 500 fathoms. Because cusk don't school, most are caught by trawl as a bycatch of more highly valued species like haddock and cod. The remainder of the catch is landed by longliners. Market size varies from 2- to 3-pound "squirrels" brought in by longliners to 15-pounders landed by draggers.

FLAVOR

TEXTURE

PRODUCT PROFILE

The cusk's flesh is white when raw and becomes an opaque white after it's been cooked.

The meat is firmer and chewier than cod. The flavor is mild and sweet, much like cod.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	87
Fat Calories	6
Total Fat	0.7 g
Saturated Fat	N/A
Cholesterol	41 mg
Sodium	31 mg
Protein	19 g
Omega-3	N/A

Source: USDA

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

Whole

Fillets, skinless, bone-in or semi-boneless

Frozen

Fillets, skinless bone-in

Salted

COOKING TIPS

Cusk meat is somewhat oilier than other whitefish, so it can be grilled and baked. It is also considered a good frying fish. The dense flesh takes longer to cook than cod or haddock. Because the firm meat holds together well, cusk is good in soups and chowders. This quality also makes it a good candidate for kabobs.

Substitutions Cod, Haddock, Pollock

GLOBAL SUPPLY

Canada
France
Iceland
Norway
United States

Dogfish

French	*Aiguillat commun*
German	*Dornhai*
Italian	*Spinarolo*
Japanese	*Aburatsunozame*
Spanish	*Mielga*

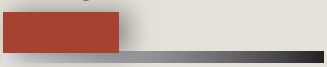
YOU SHOULD KNOW...

To get rid of ammonia traces, soak dogfish in a mixture of icewater and vinegar or fresh lemon for four to five hours. Use enough water to cover the meat, and add 1 tablespoon of vinegar or lemon juice per pound.

Scientific name: *Squalus acanthius*
Market names: Spiny dogfish, cape shark
Common names: Dogfish, sand shark, rock salmon (UK)

This bone-free shark possesses many of the attributes U.S. consumers are looking for. Promoters hope to find greater acceptance for the dogfish by marketing it under a Food-and-Drug-Administration-approved alternative name: "Cape shark." Domestically, the species is found along the Pacific Coast from the Gulf of Alaska to Point Conception, California. On the Atlantic Coast, it roams between Cape Sable, Nova Scotia, and Cape Cod. Cape shark is targeted by longliners and landed as a bycatch of gillnetters. Market size is about 3 feet, with an average weight of 7 to 10 pounds. Like all sharks, dogfish are elasmobranchs, which means they have cartilage instead of bone for a skeleton. Sharks also lack a traditional urinary tract, so they concentrate urea, a waste product, in their blood and excrete it through their skin. As soon as it's caught, dogfish must be gutted, bled and chilled. Otherwise, the urea remains in the flesh, and an ammonia smell develops within 24 hours.

FLAVOR



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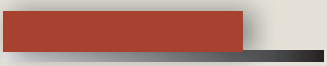


PRODUCT PROFILE

Spiny dogfish meat has a sweet, mild flavor and a higher oil content than mako or other sharks. It has a flaky yet firm texture. The raw meat is white. The outer flesh can have a reddish color. If not cut away, the reddish portion turns brown when cooked. The rest of the meat cooks up white. The oil content helps keep the flesh moist.

Dogfish meat should have a faintly sweet smell; although a slight metallic odor is acceptable, an ammonia taint is not.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed shark species)

AMOUNT PER SERVING	
Calories	130
Fat Calories	41
Total Fat	4.5 g
Saturated Fat	0.9 g
Cholesterol	51 mg
Sodium	79 mg
Protein	20.9 g
Omega-3	0.9 g

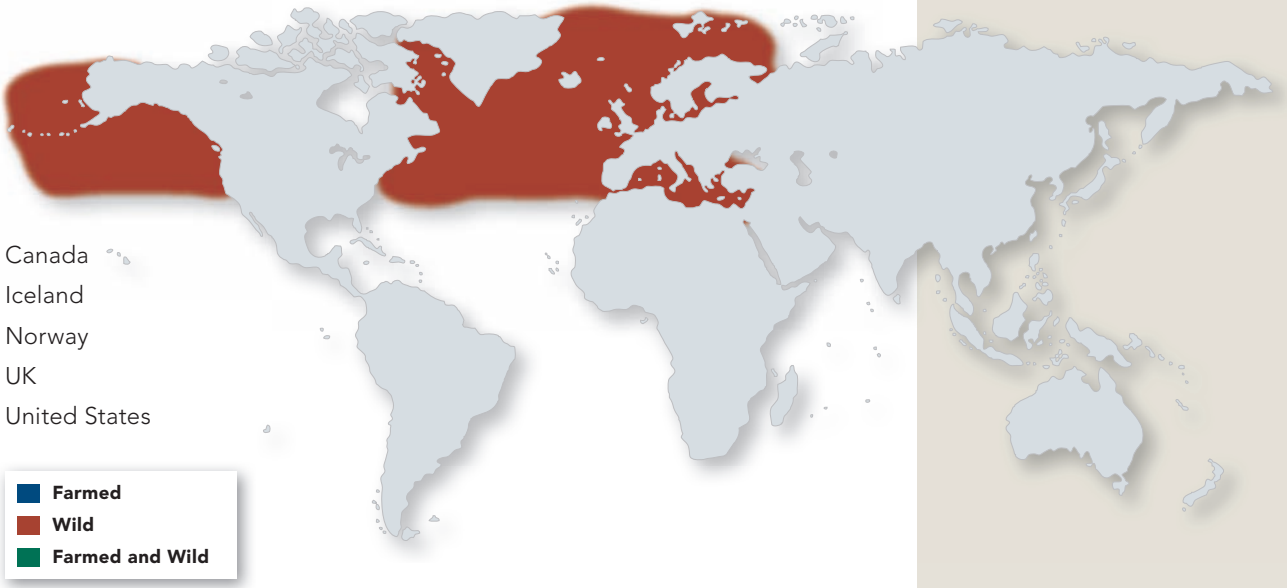
Source: *USDA*

COOKING TIPS

Creative cooking suggestions and preparations will increase customers' willingness to try this versatile species. You can deep fry spiny dogfish, as the British do for fish and chips, but don't stop there. Use cubed meat for kebabs or in stir fries. Dogfish smokes nicely because of its oily flesh. The fins can be used in shark-fin soup, and the firm meat makes an ideal chowder ingredient.

Substitutions Mackerel, Other sharks

GLOBAL SUPPLY



Canada
Iceland
Norway
UK
United States

Farmed
Wild
Farmed and Wild

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

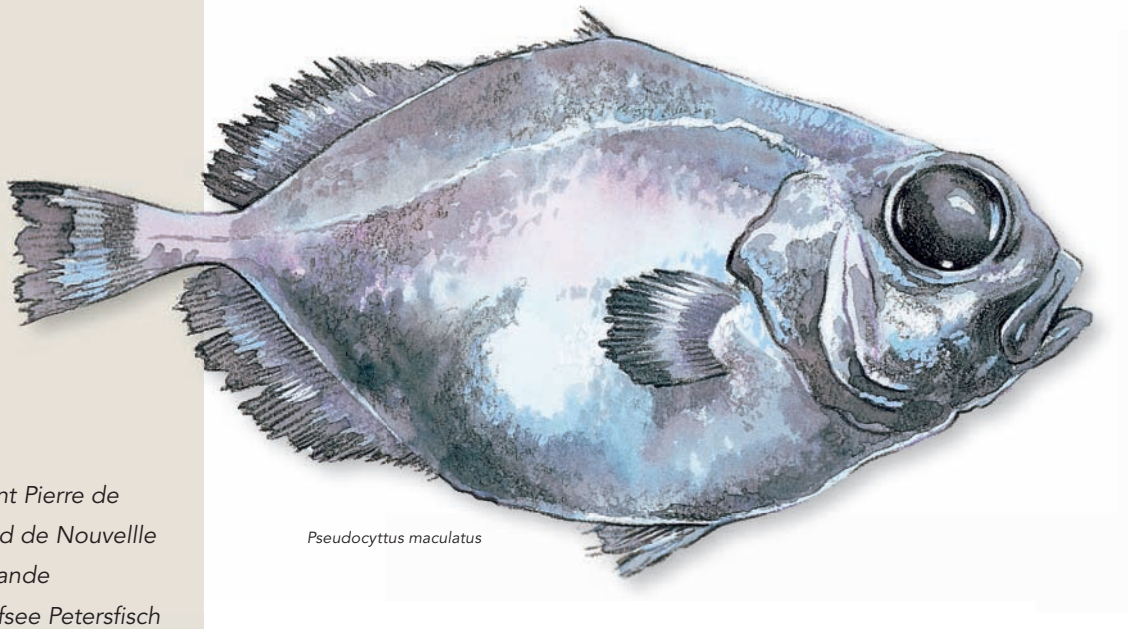
PRIMARY PRODUCT FORMS

Fresh
- Whole
- H&G
- Fillets (skin-on/skinless)
- Steaks
- Backs

Frozen
- H&G
- Fillets (skin-off)
- Steaks
- Backs

Value-added
- Livers
- Dried fins
- Tails
- Smoked belly flaps

Dory



Pseudocyttus maculatus

French	*Saint Pierre de fond de Nouvellle Zelande*
German	*Tiefsee Petersfisch*
Italian	*Triglia*
Japanese	*Ôme-matodai-zoku*
Spanish	*Salmonete*

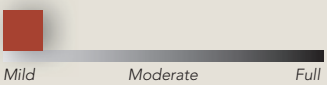
YOU SHOULD KNOW...

Since oreo dories are generally imported in skin-off fillet form, it can be very difficult to tell the species apart. The best way to tell oreos apart is to buy from known sources and insist on proper labeling.

Scientific names: *Allocyttus niger; Pseudocyttus maculatus*
Market name: Oreo dory
Common names: Black oreo dory; smooth oreo dory

The prized species that shares the dory name is the John Dory (*Zeus faber*), but only a small volume of this excellent and expensive fish is available in the United States. Two related species from New Zealand, black and smooth oreo dories, are more common to the U.S. market. Though they look a lot like the John Dory and have similar lean, white, flesh, they are not true dories but members of the family Oreosomatidae. The black oreo dory has rough, black skin. The brown skin of the smooth oreo dory is as its name indicates. The smooth oreo is more highly regarded than the black, since it offers larger, whiter fillets. Market size for both oreos ranges from 1 to 2 pounds. The oreos are trawl-caught, both as targeted species and sometimes as a bycatch of the orange roughy fishery. Because they are harvested far offshore, oreos are almost always marketed frozen.

FLAVOR



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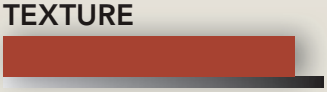


PRODUCT PROFILE

Black oreo dory has small, thin, cream-colored fillets that turn ivory when cooked. Smooth oreo dory has larger, thicker fillets than black oreo and cooks up whiter.

Both dories are at the mild end of the flavor scale, though black oreo dory has a higher oil content than the smooth oreo. The texture is firm, especially so with smooth oreo dory. Neither fish flakes easily.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (smooth oreo, raw)

AMOUNT PER SERVING	
Calories	82
Fat Calories	37
Total Fat	4.1 g
Saturated Fat	N/A
Cholesterol	31 mg
Sodium	113 mg
Protein	11 g
Omega-3	N/A

Source: www.sealord.co.nz
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- ☐ Bake
- ☐ Broil
- ■ Fry
- ☐ Grill
- ■ Poach
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Frozen

Skinless fillets

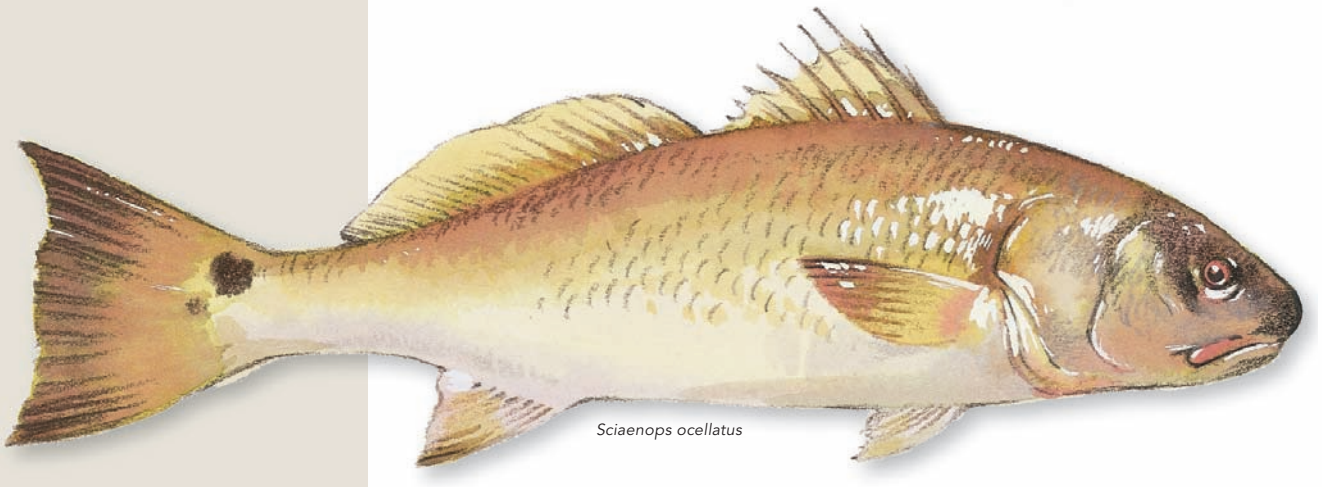
COOKING TIPS

Dories lend themselves best to pan frying or moist cooking methods, since the lean meat can easily become dry if subjected to dry heat. The thinner fillets of the black oreo dory are especially prone to drying out. The firm oreo meat generally stays intact during cooking, which makes it a good choice for soups and stews. The fillets are also particularly good pan-fried with a wine sauce.

Substitutions Orange roughy, Flounder, Ocean perch

GLOBAL SUPPLY

Drum



Sciaenops ocellatus

French	*Tambour*
German	*Adlerfisch*
Italian	*Scienide*
Japanese	*Ishimochi*
Spanish	*Corbina*

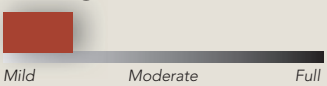
YOU SHOULD KNOW...

Buying whole fish or skin-on fillets is the easiest way to distinguish between black and red drum. Redfish are smaller, with distinctive black spots on their tails and copper-colored scales.

Scientific name: *Sciaenops ocellatus; Pogonias cromis*
Market name: Drum or redfish; drum
Common names: Red drum, channel bass, spottail, spotted bass, bull redfish; black drum, oyster drum, sea drum, gray drum

Dozens of drum species are found in tropical waters of the Atlantic and Pacific oceans and in the Gulf Mexico. Of greatest value in a niche U.S. market are the red drum and black drum, named for the loud drumming noise they make by contracting muscles connected to their air bladders. Red drum is the species of blackened redfish fame, overharvested to the point of closing the U.S. fishery. It is now imported from Mexico, Argentina, Ecuador and Central America and commands high prices. Farmed product from Texas, Taiwan and Ecuador supplements limited wild supplies. Demand has shifted to the more plentiful, lower-priced black drum, found from Virginia to the northern Gulf of Mexico, though restrictions on commercial fishing have tightened supplies of this species as well.

FLAVOR



TEXTURE

PRODUCT PROFILE

The flesh of small, very fresh red drum has an almost emerald-green tint. Meat of larger red drums is white with a red tint. The raw flesh of black drum is whiter, though that of both species cooks up snow white.

Both the red and black drum have a sweet, mild flavor and firm, moist flesh, similar to snapper in texture. Some think the small "puppy" drums are sweeter and flakier than the larger "bulls." Black drum meat is coarser than red drum.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. *(Aplodinotus grunniens Rafinesque)*

AMOUNT PER SERVING	
Calories	119
Fat Calories	45
Total Fat	4.9 g
Saturated Fat	1.1 g
Cholesterol	64 mg
Sodium	75 mg
Protein	17.5 g
Omega-3	0.7 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

Gutted, head-on or off

Fillets (skinless or skin-on)

Frozen

H&G

Fillets (skinless)

COOKING TIPS

Black and red drum can be used interchangeably, though black drum is more meaty and can hold up under almost any cooking method. Meat from larger drums is especially good in chowders or bouillabaisse. Drums carry trematode parasites, so they must be cooked to an internal temperature of 145°F. It's not a fish you'd want to use for sashimi or ceviche.

Substitutions Mullet, Snapper, Croaker

GLOBAL SUPPLY

Eel

French	*Anguille Américaine*
German	*Amerikanischer Aal*
Italian	*Anguilla Americana*
Japanese	*Unagi*
Spanish	*Anguila Americana*

Scientific name: *Anguilla rostrata*
Market name: Freshwater eel
Common names: American eel, common eel, Atlantic eel, silver eel

YOU SHOULD KNOW...

Adult eels are known as "yellows," "silvers" or "bronzes." These are references to stages of maturity, not different species or harvest origins.

American eels are one of 15 related, snakelike fish species that include the European eel (*Anguilla anguilla*) and eels in tropical or subtropical rivers entering the Pacific or Indian oceans. Eels are catadromous, meaning that they spawn in the ocean but mature in fresh water. Most eels are caught at their freshwater stage. American and European eels both spawn in the Sargasso Sea but return to their respective home waters as separate stocks. American eels are found in coastal rivers from Greenland to the Gulf of Mexico and are plentiful in New York, New Jersey, Delaware, Maryland and Virginia. The American eel fishery has two components. One is for 2-inch-long baby eels (called "glass eels" or "elvers"), netted from estuaries and brackish bays to supply Asian and European aquafarms. The second targets adult eels as they travel downstream to spawn, where they are harvested with weirs, pots and dip nets.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

Eel meat has a very firm texture, high fat content and full, distinctive flavor. The raw flesh is gray but turns white when cooked and has a small flake.

Eel is best bought when still alive, or the flesh can be soft. The animals can survive for several days out of water if kept in a damp environment. Eels harvested from stagnant water or held too long in tanks can have a slightly muddy flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	184
Fat Calories	101.7
Total Fat	11.6 g
Saturated Fat	2.4 g
Cholesterol	126 mg
Sodium	51 mg
Protein	18.4 g
Omega-3	0.2 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

For eel, use cooking methods that help eliminate some of the oil. Avoid heavy sauces that compete with the rich flavor; instead, opt for acidic accompaniments to help counter the fatty meat. Eel is good simmered in a stew. Don't serve it raw; even in sushi, or unagi, it's in cooked form. Elvers are usually cooked whole. Skinless, H&G eel is usually filleted or cut into sections of less than 2 inches.

Substitutions None

GLOBAL SUPPLY

Canada
China
Greenland
Japan
Taiwan
United States

COOKING METHODS

- ☐ Bake
- ☐ Broil
- ☐ Fry
- ■ Grill
- ■ Poach
- ☐ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live
- Fresh
- Whole
- H&G (skinned and skinless)
- Steaks
- Fillets

Frozen
- H&G
- Steaks
- Fillets

Value-added
- Smoked
- Jellied
- Cured

Escolar

French	*Escolier noir*
German	*Escolar-schlangenmakrele*
Italian	*Escolar*
Spanish	*Escolar negro*

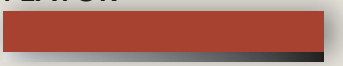
YOU SHOULD KNOW...

Don't buy the oilfish *Ruvettus pretiosus* disguised as escolar. Oilfish fillets typically sell for $3 a pound less than true escolar, and they truly will make people sick.

Scientific name: *Lepidocybium flavobrunneum*
Market name: Escolar
Common names: Escolar, oilfish

Though two fish species are marketed as escolar, *L. flavobrunneum* is considered the true escolar internationally, and the lesser-valued *Ruvettus pretiosus* is more widely known as oilfish or castor oil fish. Though considered a succulent species by those familiar with it, escolar's association with oilfish has tainted its reputation. The Food and Drug Administration says escolar has "purgative" qualities and advises against importation. But many chefs who handle escolar contend that it's *R. pretiosus* that's to blame for making people sick. Found in tropical and temperate waters worldwide, escolar is almost exclusively a bycatch of tuna longline fisheries. Escolar is imported from Fiji, Ecuador and other countries with warmwater tuna fisheries. In the United States, it comes primarily from the Gulf of Mexico. Since tuna fishing is best during the late phases of the moon, there's usually more escolar on the market in the days following a full moon.

FLAVOR



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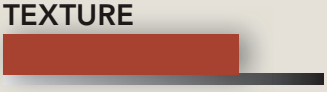


PRODUCT PROFILE

Escolar is in a culinary class with Chilean sea bass, sablefish and other rich, highly prized fish. The meat is oil-rich and flavor-intensive. Raw flesh is a bright white to light-cream color and cooks up snow white. True escolar fillets are whiter than fillets of *Ruvettus pretiosus*, which turn yellowish when cooked.

Though slightly gelatinous, escolar flesh should have some elasticity and spring back when pressed. If it doesn't, it's old.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	240
Fat Calories	174.6
Total Fat	19.4 g
Saturated Fat	N/A
Cholesterol	N/A
Sodium	N/A
Protein	16.2 g
Omega-3	N/A

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Emeril Lagasse, one of the first celebrity chefs to menu escolar, reports that the thousands of customers to whom he's served the fish have never had a problem with it. The oil-rich meat is great for grilling, and its distinctive taste can stand up to strong accompaniments. Try grilling it over mesquite and serving with chipotle vinaigrette and fresh tomato salsa.

Substitutions Chilean sea bass, Sablefish

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- □ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

H&G

Fillets (skinless or skin-on)

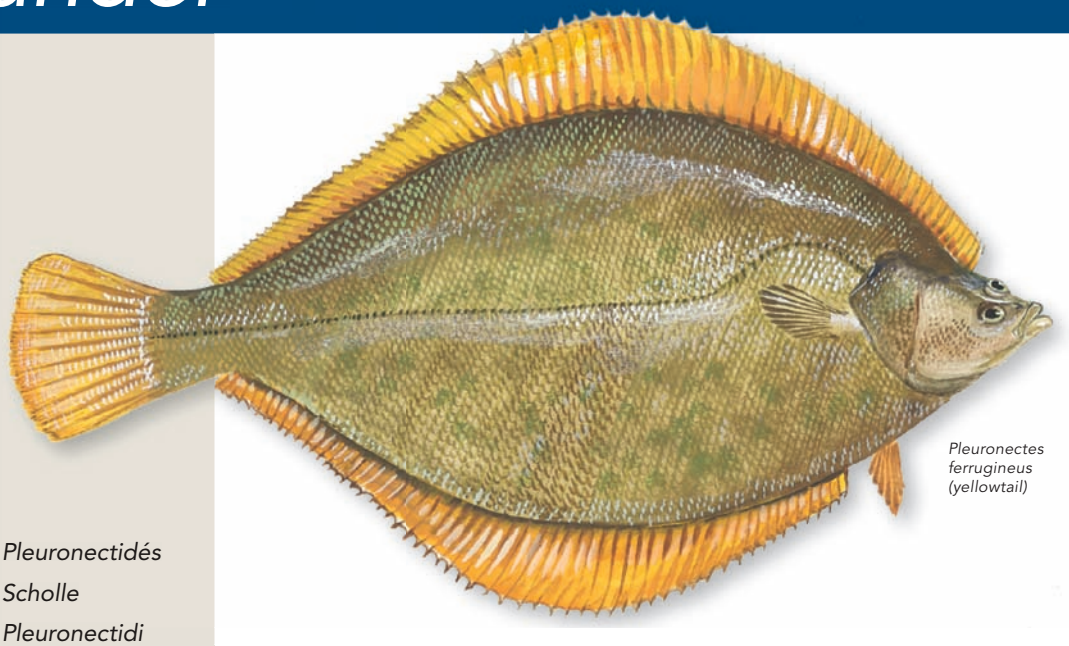
Frozen

H&G

Fillets (skinless or skin-on)

GLOBAL SUPPLY

Flounder



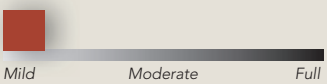
Pleuronectes ferrugineus (yellowtail)

French	*Pleuronectidés*
German	*Scholle*
Italian	*Pleuronectidi*
Japanese	*Akagarei*
Spanish	*Platija Americana*

YOU SHOULD KNOW...

Some processors use tripolyphosphates to increase moisture levels and extend shelf life of frozen flounder fillets. This adds water weight to the product, so make sure you're buying fish, not water. Feel the fillets — if they feel abnormally wet, they may have been treated.

FLAVOR



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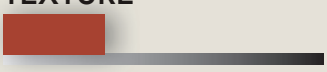


Scientific name: *Pleuronectes* spp; *Microstomus pacificus; Eopsetta jordani; Glyptocephalus cygnoglossus; Paralichthys dentatus*

Market name: Flounder, sole

Common names: Rock sole, yellowtail flounder, sand dab, yellowfin sole, dab; Dover sole, Alaska Dover, American Dover; petrale sole, California sole; gray sole, lemon sole, witch flounder; summer flounder, plaice Northern fluke

Around 540 flatfish species belong to the taxonomic order Pleuronectiformes, meaning "sideswimmer." Flatfish are found throughout the world, though the most commercially important family, Plueronectidae, is concentrated in northern waters. Yellowtail is the most important Atlantic Coast flounder, and petrale sole is the most important West Coast species. Flatfish have both eyes on one side of the head, though they begin life as normal fish. As they become bottom dwellers, one eye migrates to the other side, resulting in "right-eyed" and "left-eyed" flatfish. Soles and flounders harvested commercially in North America are right-eyed, except fluke. Flounder fillets vary in shape, depending on the species. Gray sole offers long, slender fillets; yellowtail flounder, rock sole, lemon sole, fluke and dab offer thicker, broader fillets.

PRODUCT PROFILE

Raw flounder ranges from tan to pinkish to snow white, but cooked meat of all species is pure white, lean, boneless and flaky with a mild flavor, ranging from bland to sweet. Taste and texture vary, depending on species. Petrale sole, with firm, delicate-tasting flesh, is considered the premier Pacific sole. Pacific Dover, with softer flesh, is a lesser-quality product. Cooked meat of smaller soles and flounders is delicate, while larger species like fluke or dab are firm and meaty.

The sweet taste and firm texture of yellowtail flounder is often regarded as the standard to which other flounders are compared. Lemon and gray sole aren't far behind.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	91
Fat Calories	10.8
Total Fat	1.2 g
Saturated Fat	0.3 g
Cholesterol	48 mg
Sodium	81 mg
Protein	18.8 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Fishery Products International

COOKING TIPS

Use wine, sauce, other liquids or moist vegetables to keep thin flatfish fillets from drying out. Avoid sauces and herbs that overpower their delicate taste. Thicker fillets are great for broiling, served with lightly herbed butter. The firm and meaty flesh of larger species like fluke or dab is good for rolling or stuffing. Small H&G sole — like rex or gray — can be grilled, baked or stuffed, but not filleted, because fillets would be too small.

Substitutions Other thin whitefish fillets

GLOBAL SUPPLY

Canada
Iceland
Norway
Russia
UK
United States

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- Dressed (head on, boneless)
- H&G
- Fillets

Frozen
- Whole
- Dressed (head on)
- H&G
- Fillets
- Blocks (mainly yellowfin fillets)

Value-added
- Breaded/battered portions
- Whole, stuffed
- Smoked

Grouper

Epinephelus morio

French	*Mérou nègre*
German	*Zackenbarsch*
Italian	*Cernia*
Japanese	*Hata*
Spanish	*Mero, garoupa*

YOU SHOULD KNOW...

Groupers, particularly large reds, are prone to parasites in the summer. They pose no health hazard to humans when properly cooked or frozen. Being a reef fish, grouper can also cause ciguatera poisoning, though incidences are rare.

Scientific names: *Epinephelus morio; Mycteroperca bonaci*
Market name: Grouper
Common names: Red grouper; black grouper, gag

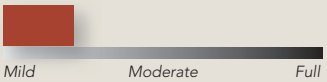
Groupers belong to one of the largest and most widely distributed families of fish, the sea basses. Red grouper (*Epinephelus morio*) is the most frequently seen grouper in the marketplace and is valued for its availability, flavor and size. Because of limited commercial supplies of the true black grouper (*Mycteroperca spp.*), it has largely been replaced by the gag (*M. microlepis*), which offers similar edibility and value. Some processors call gag "the grouper of choice," since it offers better yield and firmer meat. It is referred to in the market as black grouper. Market size for black grouper is around 20 pounds, and red grouper is marketed at anywhere from 5 to 15 pounds. Groupers are found in temperate waters from the Mid-Atlantic states and Florida to South America, Central America and the Gulf of Mexico. Groupers are typically caught by hook and line.

PRODUCT PROFILE

Groupers have a mild but distinct flavor, somewhere between bass and halibut. The taste of most groupers is similar, with slight differences in flavor and texture, depending on size, species and location of harvest. Red grouper is sweeter and milder than black grouper, and many consider reds the better of the two.

Once the skin is removed from the fish, it's hard to tell red and black grouper apart, but black grouper does have firmer meat in the fresh state. The raw meat of both is white and lean with a notable lack of bones. Cooked, the white meat has a very firm texture and heavy flake and remains moist.

FLAVOR



TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	92
Fat Calories	9.2
Total Fat	1 g
Saturated Fat	0.2 g
Cholesterol	37 mg
Sodium	53 mg
Protein	19.4 g
Omega-3	0.3 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING TIPS

In the South, blackened grouper is a favorite preparation, but this versatile fish can be fried, grilled, skewered or used in chowders and soups. Larger whole grouper can be roasted, and large fillets should be butterflied before grilling because of their thickness. Grouper is very forgiving; it can be over-cooked and still remain moist.

Substitutions Sea bass, Dogfish, Mahimahi

GLOBAL SUPPLY

Brazil
Ecuador
Honduras
Mexico
Nicaragua
Panama
United States

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [ ] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole
- Dressed
- H&G
- Fillets
- Fingers

Frozen

- Dressed
- H&G
- Fillets
- Fingers

Haddock

French	*Églefin*
German	*Schellfisch*
Italian	*Eglefino*
Japanese	*Montsukidara*
Spanish	*Eglefino*

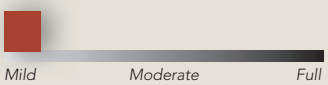
YOU SHOULD KNOW...

Since much haddock is sold skinless these days, buyers don't always have the "thumbprint" to judge by. But haddock fillets are smaller than those from cod and have a finer flake.

Scientific name: *Melanogrammus aeglefinus*
Market name: Haddock
Common names: Haddock, scrod haddock, finnan haddie

A premium whitefish, haddock is a member of the cod family, though smaller than Atlantic cod, generally weighing 2 to 5 pounds. The haddock bears a distinguishing black mark, often referred to as the "devil's thumbprint" or "St. Peter's mark," in the "shoulder" area, and its skin is less mottled than the cod's. The term "scrod" is used to describe head-on, gutted haddock between 1 1/2 and 2 pounds. Haddock under 1 1/2 pounds are referred to as "snapper haddock," and 2 1/2 pounds and up are "large." Haddock is found on both sides of the North Atlantic. Highest concentrations on the U.S./Canada coast occur on Georges Bank and in the Gulf of Maine. Haddock is also found throughout northern Europe, where it is revered for fish and chips and as a cold-smoked product — the famous finnan haddie invented in Scotland over a century ago. Haddock are taken by longlines and trawl nets.

FLAVOR



TEXTURE

PRODUCT PROFILE

Haddock's delicate flake and slightly sweet taste give it a wonderful, melt-in-the-mouth appeal. The lean meat has a firm yet tender texture, and the flake is finer than cod.

The raw meat is white and cooks up even whiter. The flesh should be firm and resilient. A thin layer of connective tissue covering the flesh helps differentiate it from cod.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	87
Fat Calories	6.5
Total Fat	0.7 g
Saturated Fat	0.1 g
Cholesterol	57 mg
Sodium	68 mg
Protein	18.9 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Icelandic USA

COOKING TIPS

The same recipes that work for cod are good for the versatile haddock. Smaller haddock fillets are easily sautéed, while all haddock is good in soups and stews. Haddock is good poached and excellent for pan frying, as the meat holds together better than cod or pollock. Haddock frames are good for stock. Smoked haddock, or "finnan haddie," is one of the most popular variations.

Substitutions Cod, Hake, Grouper

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- □ Grill
- ■ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh

- Dressed, head-on
- H&G
- Fillets (skin-on)
- Loins

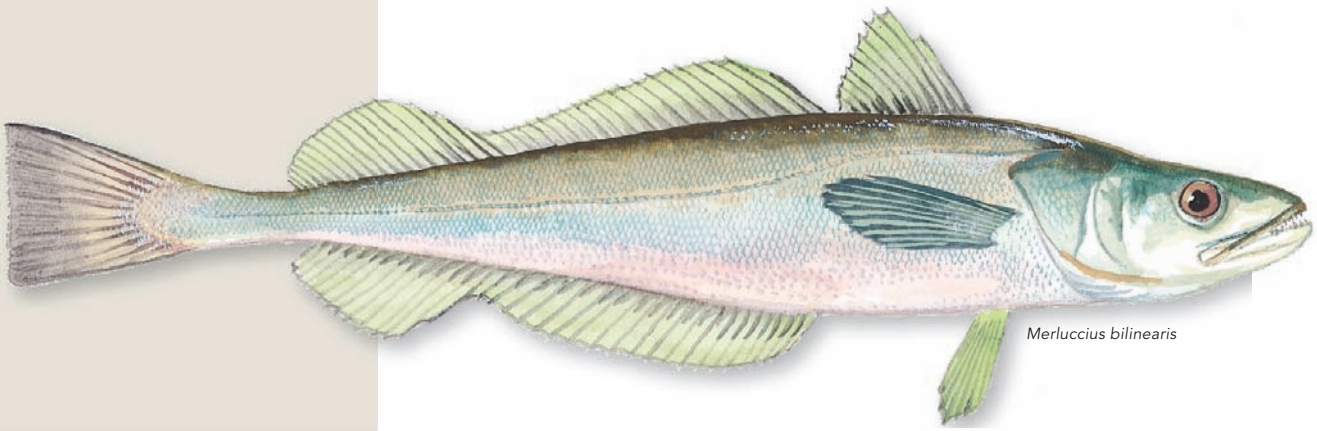
Frozen

- H&G
- Fillets (skin-on)
- Blocks

Value-added

- Breaded portions
- Smoked

Hake



Merluccius bilinearis

French	*Merlu*
German	*Seehecht*
Italian	*Nasello*
Japanese	*Heiku*
Spanish	*Merluza*

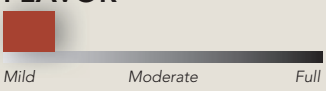
YOU SHOULD KNOW...

There is a wide range of hake species, and the fish are fragile and highly perishable, meaning quality of the end product can range from poor to excellent. It pays to know your species and your supplier.

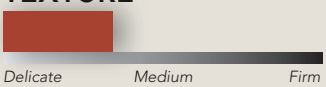
Scientific name: *Merluccius* spp.
Market names: Hake; Cape capensis; Antarctic queen
Common names: Whiting; Argentine whiting; Chilean hake; capensis, South African whiting; Pacific hake/whiting, North Pacific whiting; Atlantic hake/whiting, silver hake

More than a dozen hake and whiting species inhabit temperate and cold waters of the Northern and Southern Hemispheres. Quality varies, depending upon species and handling. There are two separate families of hake, Merluccidae and Gadidae, but *Merluccius* is most common in the U.S. market, particularly Atlantic whiting *(M. bilinearis)*, or silver hake from the Northwest Atlantic. Pacific whiting *(M. productus)*, found from the Bering Sea to Baja California, has very soft flesh and is frozen almost immediately to retain its value. Most hakes are identified by geographic origin outside the United States, which imports large amounts of Argentine whiting *(M. hubbsi)* and Chilean hake *(M. gayi)*. Two high-end hakes from Southwest Africa, *M. capensis* and *M. paradoxus*, are marketed as Cape capensis. *M. australis*, a big hake from southern Chile, is sold as Antarctic queen.

FLAVOR



TEXTURE



PRODUCT PROFILE

Hakes range in size from the 6-pound capensis to 1- to 2-pound Pacific whiting. Texture varies from soft to moderately firm among the species, though, overall, hakes have softer flesh and less flake than cod, haddock and pollock. The best species, like Cape capensis and Antarctic queen, have a texture similar to sole. Hake is mild-tasting, even a bit sweet.

Raw flesh is lean and white to off-white (South American hake may be somewhat tan), with a coarse, watery appearance; cooked, it ranges from pure white to off-white. Capensis offers the firmest meat of the lot, followed by Atlantic and Argentine hake.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	90
Fat Calories	12
Total Fat	1.3 g
Saturated Fat	0.2 g
Cholesterol	67 mg
Sodium	72 mg
Protein	18.3 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Alba Specialty Seafood Co.

COOKING TIPS

Hake can be substituted for many dishes calling for pollock or cod. The less expensive species, like Pacific whiting, Argentine hake and silver hake, are excellent fried in a light, crispy batter. Since it is bland-tasting, Pacific hake welcomes a broad range of seasonings. It is often used for fish sticks and cakes. Atlantic whiting, which is firmer in texture, is popular as corned hake in New England. The key with all hakes is to treat them gently in the kitchen.

Substitutions Cod, Pollock, Flounder

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- H&G
- Fillets

Frozen
- H&G
- Fillets
- Blocks

Value-added
- Breaded portions
- Smoked
- Salted (white and red hake)
- Surimi

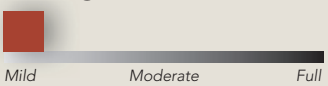
Halibut

French	*Flétan du Pacifique*
German	*Heilbutt*
Italian	*Halibut*
Japanese	*Ohyô*
Spanish	*Halibut*

YOU SHOULD KNOW...

Halibut can harbor undetectable, microscopic organisms that cause meat to turn mushy during cooking. Occurrences are uncommon, and the harmless protozoans are killed by cooking to 140 degrees.

FLAVOR



TEXTURE

Scientific name: *Hippoglossus stenolepsis*
Market name: Halibut
Common names: Pacific halibut, northern halibut, Alaska halibut

Size is the most distinguishing characteristic of the Pacific halibut. The largest of all flatfish, halibut can stretch up to 8 feet long and 4 feet across and weigh over 600 pounds. While such sizes are exceptional, it's easy to see why fishermen refer to these fish as "whales" or "barn doors." Market sizes run anywhere from 10 to 200 pounds. Pacific halibut are found along the Pacific Coast from northern California to the Bering Sea and westward to Russia and the Sea of Japan. Halibut are taken by longlines, primarily in Alaska and British Columbia. A quota system stretches the fishing season over several months, so fresh halibut is available nearly all year. For the first three months of winter, however, it's scarce. That's when you might want to remember the advice an 1866 article in *Atlantic Monthly* offered single women planning meals: "Don't buy quails, for they are all gizzard and feather; and don't buy halibut until you have inquired of the price."

PRODUCT PROFILE

Halibut retains its moisture well in frozen state and keeps its texture when cooked. It's a very mild, sweet-tasting, lean fish with fine-grained, dense meat that dries out if overcooked.

Uncooked, the white flesh of halibut should be almost translucent, not dull, yellowish or dried out. When cooked, the snow-white meat loses its glossy appearance and is flaky and tender though still firm. It holds together well, and bones are easily spotted. Meat from larger fish may have a slightly coarser texture.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	110
Fat Calories	20.7
Total Fat	2.3 g
Saturated Fat	0.3 g
Cholesterol	32 mg
Sodium	54 mg
Protein	20.8 g
Omega-3	0.5 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Halibut is an extremely versatile fish, and the thick, meaty flesh holds up well to a number of cooking methods and sauces. It's ideal for skewering as kebabs. A Canadian recipe calls for baking halibut with sour cream. Place fish in a greased, shallow baking dish. Season with salt, pepper and tarragon; dot with butter and sprinkle with chopped shallots. Cover with sour cream and bake at 375°F until fish flakes when tested with a fork. Before serving, garnish with parsley or chives or sprinkle with paprika.

Substitutions Grouper, Snapper, Large cod

GLOBAL SUPPLY

Canada
Russia
United States

Farmed
Wild
Farmed and Wild

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

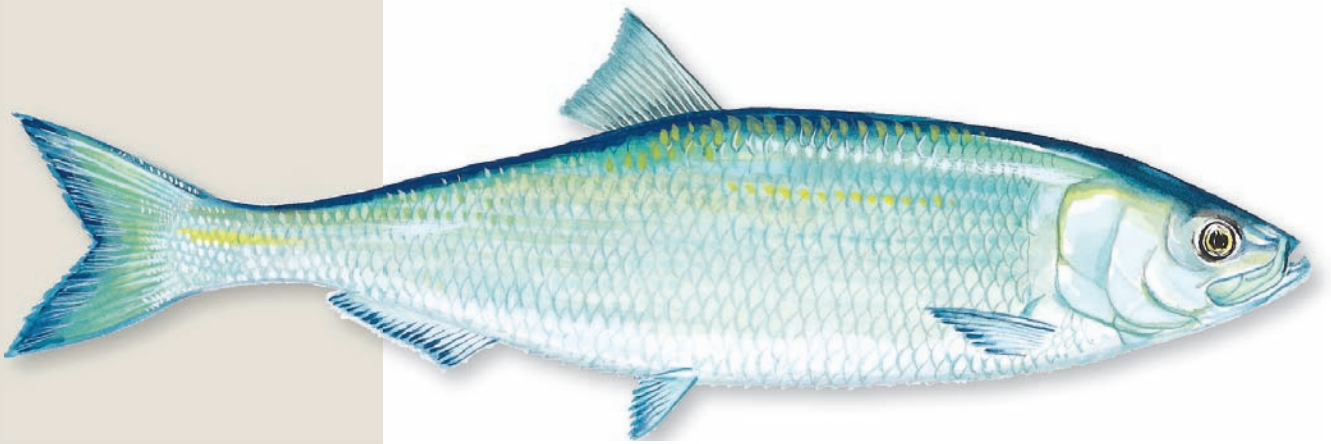
Fresh

- H&G
- Fillets
- Loins
- Steaks
- Fletches
- Roasts

Frozen

- H&G
- Fillets
- Loins
- Steaks
- Fletches
- Roasts

Herring



French	*Hareng*
German	*Hering*
Italian	*Aringa*
Japanese	*Nishin*
Spanish	*Arenque*

YOU SHOULD KNOW...

Herring is a bony fish, but in most of its popular forms (marinated and as sardines), the fine bones are not a problem. They are soft and perfectly safe to eat once cooked. And they are a good source of calcium.

Scientific name: *Clupea harengus*
Market name: Herring
Common names: Atlantic herring, Pacific herring, sardine

The humble herring once determined the fate of kings and empires. The powerful Hanseatic League of Germany and Scandinavia collapsed in the 15th century when herring stopped spawning in the Baltic Sea. Treaties worth millions of dollars were negotiated for herring rights in the New World. But, in America, herring was strictly a food of the laboring class for several decades, starting with the Boston Irish in the 1880s. The American palate is most accustomed to herring as canned sardines. There are two types of commercially important herring. Atlantic herring *(Clupea harengus harengus)* is found across the North Atlantic; Pacific herring *(C. harengus pallasi)* range from northern California to Alaska and from eastern Russia south to Japan. Herring is gillnetted, seined and caught with midwater trawls. The fish is also trapped in shore-based weirs in New Brunswick, Canada and Maine. Market size is 5 to 9 inches.

FLAVOR

TEXTURE

PRODUCT PROFILE

Fresh herring ranges from delicately flavored small fish to larger fish with a fuller, "oilier" flavor. Otherwise, flavor and texture depend on how the herring has been prepared — whether pickled, smoked or salted.

Fresh, whole herring should be bright with hard bellies. Scales are large, loosely attached and cover the entire body. The meat of fresh herring is off-white and soft; sardines range from light to dark brown, with small bones visible; kippers are clear, light meat without bones.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, Atlantic herring)

AMOUNT PER SERVING	
Calories	158
Fat Calories	81
Total Fat	9.0 g
Saturated Fat	2.0 g
Cholesterol	60 mg
Sodium	90 mg
Protein	17.9 g
Omega-3	1.6 g

Source: USDA

Photo courtesy of Alf Boerjesson/Norwegian Seafood Export Council

COOKING TIPS

Though fresh herring can be cooked in nearly any fashion except poaching or steaming, it's rare to find well-handled fresh product in the United States. Most of the herring eaten here is in canned, pickled or smoked form. Because of the high oil content, herring is a good candidate for smoking, and the fish's soft meat firms up if pickled in brine. The Scots fry fresh herring, rolling it in coarse oatmeal first.

Substitutions Bluefish, Mackerel

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- □ Poach
- □ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- Fillets

Frozen
- Whole
- Fillets

Value-added
- Canned
- Smoked
- Pickled
- Salted

Hoki

French	*Merlu à longue queue*
German	*Langschwanz-seehecht*
Italian	*Nasello azurro*
Japanese	*Hoki*
Spanish	*Merluza azul*

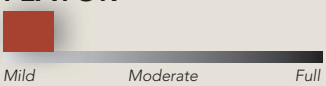
YOU SHOULD KNOW...

The fat line in hoki is usually taken out, as it reduces shelf life. Removing the fat line makes the raw fish somewhat fragile, so handle with care.

Scientific name: *Macruronus novaezelandiae*
Market name: New Zealand whiting
Common names: Hoki, New Zealand whiptail, blue hake, blue grenadier

Hoki is no looker, but a rather homely, tapered, rat-tailed specimen. It's blue-green above and silvery on the sides and belly. Hoki belongs to the hake family Merluccidae. This deepwater species is harvested year-round from depths of from 600 to 2,500 feet by trawlers working waters off New Zealand, southern Australia and Tasmania. These vessels typically process and freeze the catch at sea. Hoki average between 3 and 4 pounds but can reach up to 15 pounds. Virtually all hoki consumed in the United States is imported frozen from New Zealand. Most fresh hoki fillets are marketed in New Zealand and Australia, though limited supplies are available for export. A significant share of New Zealand's hoki resource is processed into surimi for export to Japan. Hoki is also excellent for forming into blocks and is suited to further processing into a wide range of value-added products.

FLAVOR



TEXTURE

PRODUCT PROFILE

Hoki has a delicate, sweet flavor similar to that of haddock after cooking. The lean meat is moist and firm but flakes easily. This cousin of the cod has moist, bright-white flesh, occasionally with pinkish tinges, that remains white when cooked.

Hoki fillets are long and thin and have a strip of fat beneath the lateral line. This should be removed to improve flavor. Fat-line-out hoki makes an excellent alternative to cod, whiting, pollock and other groundfish species. Defatted blocks are excellent for breaded and battered portions.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	101
Fat Calories	11.7
Total Fat	1.3 g
Saturated Fat	0.3 g
Cholesterol	54 mg
Sodium	56 mg
Protein	22 g
Omega-3	N/A

Source: New Zealand Institute for Crop & Food Research
Photo courtesy of New Zealand Seafood Industry Council

COOKING TIPS

Fragile hoki is best if cooked frozen, except when breading, deep frying or stuffing. Hoki has a limited shelf life and should be cooked within 24 hours after it thaws. Don't refreeze.

Substitutions Hake, Flounder, Haddock

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh (limited)

Fillets

Frozen

H&G
Fillets
Loins
Blocks

Value-added

Portions, specialty cuts
Breaded/battered
Surimi

GLOBAL SUPPLY

Australia
New Zealand

Kingklip

Genypterus blacodes

French	*Abadèche*
German	*Schlangenfisch*
Italian	*Kingklip*
Japanese	*Kingu*
Spanish	*Abadejo*

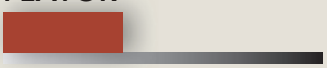
YOU SHOULD KNOW...

Buy kingklip from a reputable supplier if you want to be assured of getting red or golden instead of black. Look for darker fillets with yellow spots as the tip-off that you've been sold black kingklip.

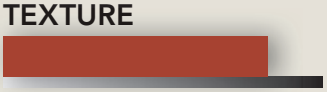
Scientific name: *Genypterus* spp.
Market name: Kingklip
Common names: Black, golden or red kingklip; South African kingklip; Chilean ling; ling; cusk-eel; congrio

The slender kingklip, a member of the cusk eel family, comprises four species: red *(G. chilensis)*, golden *(G. blacodes)*, South African *(G. capensis)* and black *(G. maculatus)*. Depending on the species, kingklip can reach 5 to 6 feet long and 50 pounds, but most found on the market average 10 pounds. Kingklip are found in waters as deep as 250 fathoms off South Africa, New Zealand and Australia as well as off the coasts of Argentina and Chile. They are caught mostly by trawlers, often as a bycatch, and by hook and line. In Europe, kingklip is marketed as cusk eel. In New Zealand it is called ling, and in South America, congrio (cusk eel). Golden, red and black kingklip are marketed internationally, but the U.S. market prefers golden and red.

FLAVOR



TEXTURE



PRODUCT PROFILE

Red is considered best of the kingklips for flavor and texture. Raw meat of red and golden kingklip is creamy white, sometimes with a yellowish tinge. It cooks up white. Black kingklip has darker meat that also cooks up darker. Black kingklip fillets are also narrower than red and golden fillets.

The flavor is mild and slightly sweet. The texture is dense but tender with a good, large flake. Black kingklip is not as tender as the other two.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (Red kingklip, raw)

AMOUNT PER SERVING	
Calories	71
Fat Calories	0
Total Fat	0 g
Saturated Fat	0 g
Cholesterol	22.1 mg
Sodium	150.4 mg
Protein	15.9 g
Omega-3	N /A

Source: Orca Bay Seafoods
Photo by Fabian Gonzales

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

COOKING TIPS

A traditional seafood in South America, kingklip is the main ingredient in caldillo congrio, a spicy, Chilean-style bouillabaisse. The fish works well in soup and stews, because the dense meat holds together. The meat's density also means that it takes longer to cook than other types of whitefish. Fillets, which range from 1 to 4 pounds, lend themselves to almost any cooking method.

Substitutions Cod, Ocean perch, Orange roughy

PRIMARY PRODUCT FORMS

Fresh

Fillets, skinless/boneless

Frozen

Whole
Fillets, IQF
Interleaved blocks

GLOBAL SUPPLY

Argentina
Australia
Chile
New Zealand
South Africa

Lingcod

French	*Terpuga buffalo*
German	*Lingcod*
Japanese	*Ainame*

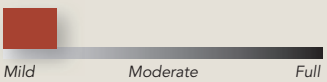
Scientific name: *Ophiodon elongatus*
Market name: Lingcod
Common names: Cultus cod, blue cod, green cod, buffalo cod, ling, greenling

YOU SHOULD KNOW...

Cheap lingcod usually means trawl-caught fish, inferior to hook-and-line lingcod. But if you know a quality-conscious skipper who makes short trips, you can get a good buy on trawled product.

If ever there were a fish with an identity crisis, it's the lingcod, for despite its name, this species is neither a cod nor a ling. Rather, it's a Pacific greenling, from the family Hexagrammidae. The lingcod likely got the name ling from early settlers who related it to European lings but acknowledged its white flaky flesh by adding cod. Cultus cod was the name used most often in the early 1900s — an insult to this fine fish, as cultus means "of little worth" in Chinook. Lingcod ranges from Baja California to Kodiak Island and the Aleutian Peninsula. It is a bycatch of trawl and longline fisheries, though there is a targeted fishery in Southeast Alaska. The best lingcod is landed by hook-and-line boats that bleed and ice the fish immediately after harvest. Lingcod can grow to 90 pounds but typical market size is around 10 pounds.

FLAVOR



TEXTURE

PRODUCT PROFILE

Don't be alarmed by the blue-green tint of the raw meat. The color cooks out completely, leaving a snow-white piece of fish.

The mild-tasting meat is tender yet firm, with large, soft, moist flakes.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	85
Fat Calories	9.5
Total Fat	1.06 g
Saturated Fat	0.19 g
Cholesterol	52 mg
Sodium	59 mg
Protein	17.7 g
Omega-3	0.0 g

Source: USDA
Photo courtesy of Duncan Law Seafood Consumer Center

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

- Fillets, skinless and boneless
- H&G
- Steaks

Frozen

- H&G
- IQF fillets
- Steaks

COOKING TIPS

A favorite in the Pacific Northwest for upscale fish and chips, lingcod can be prepared many ways. It works well on the grill, and large lingcod can be stuffed with vegetables and baked. Steaks and fillets are good baked with a topping such as a sun-dried tomato sauce. Steaks also may be steamed with herbs and spices. The density of the flesh requires a longer cooking time than that of other whitefish, but be careful not to overcook the lean meat.

Substitutions Cod, Halibut, Snapper

GLOBAL SUPPLY

Mackerel, Atlantic

French	*Maquereau*
German	*Makrele*
Italian	*Sgombro*
Japanese	*Saba*
Spanish	*Caballa*

YOU SHOULD KNOW...

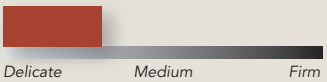
Poorly handled mackerel can produce histamine, which leads to scombroid poisoning. Keep properly refrigerated and buy only from reputable vendors.

Scientific name: *Scomber scombrus*
Market name: Mackerel
Common name: Atlantic mackerel

Mackerel is a handsome but underrated fish, probably because it doesn't have the mild-whitefish profile American consumers are most comfortable with. The mackerel looks a lot like its cousin, the tuna, but smaller — usually 1 1/2 to 2 1/2 pounds. Shaped for swift swimming, the Atlantic mackerel moves quickly when danger threatens — up to 70 mph. Mackerel travel in large schools on both sides of the Atlantic Ocean. In the Northwest Atlantic, mackerel range from northern Carolina to southern Labrador. In the eastern Atlantic, they are found off Iceland and northern Norway. Europeans harvest them by freezer trawlers. The purse seine is the harvest method of choice for North American fishermen. Immature mackerel, called tinkers, are available in spring and weigh less than a pound. They are a traditional seasonal treat in New England and sell for a considerably lower price than mature fish, which reach their prime in the summer months.

FLAVOR

TEXTURE



PRODUCT PROFILE

Mackerel has a rich, pronounced flavor. The meat is soft, flaky and moist. The outer bands of dark, strong-tasting meat along the midline may be cut out for a milder flavor.

The raw fish looks grayish and oily but firms up and becomes off-white to beige when cooked. The skin of fresh fish should have a nice sheen, and the eyes should be bright and concave. Small scales cover the entire body and give the skin a velvety texture. The mackerel's distinctive coloring quickly begins to fade after the fish dies.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	205
Fat Calories	125
Total Fat	13.9 g
Saturated Fat	3.3 g
Cholesterol	70 mg
Sodium	90 mg
Protein	18.6 g
Omega-3	2.5 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Mackerel is considered one of the more healthful fish because it's rich in omega-3 fatty acids. Its oil content makes mackerel an excellent candidate for barbecuing or smoking. A lime marinade before cooking smooths the taste and firms and whitens the meat. Europeans temper the pronounced flavor of mackerel by serving it with a sharp, acidic sauce such as gooseberry or unsweetened cranberry sauce.

Substitutions Bluefish, Mahimahi, Large herring

GLOBAL SUPPLY

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [x] Poach
- [ ] Sauté
- [x] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

Whole (gutted or ungutted)
H&G

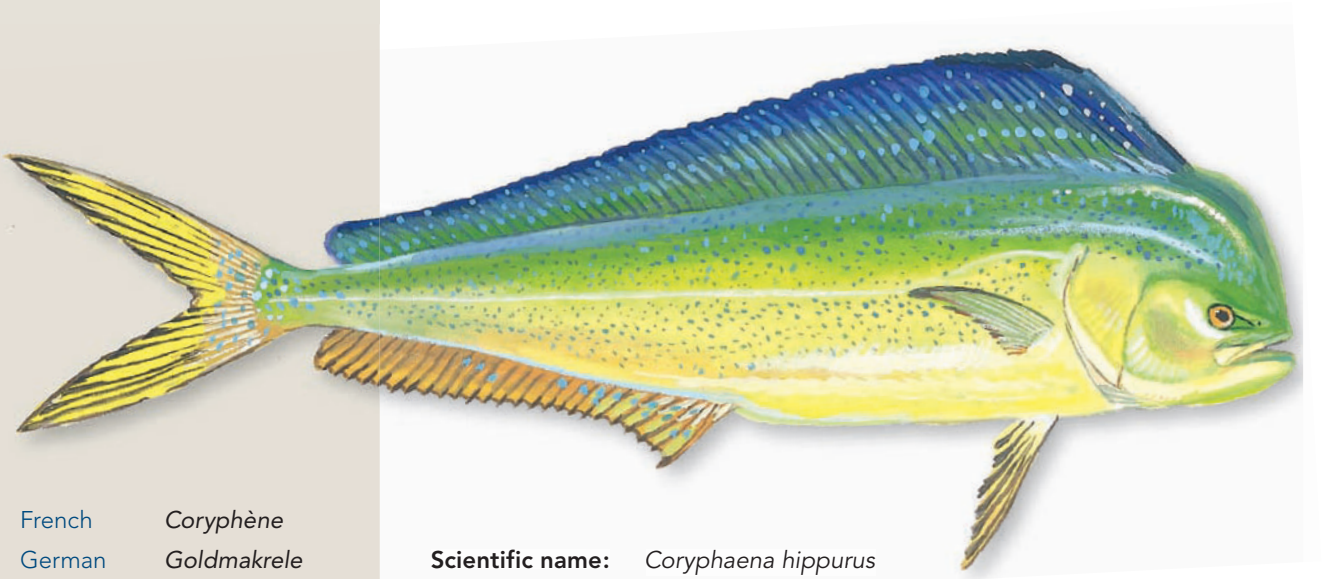
Frozen

Whole (gutted or ungutted)
H&G

Value-added

Smoked
Cured (pickled)
Salted

Mahimahi



French	*Coryphène*
German	*Goldmakrele*
Italian	*Lampuga*
Japanese	*Shiira*
Spanish	*Llampuga*

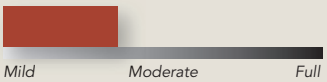
YOU SHOULD KNOW...

Poorly handled mahimahi can produce histamine, an organic substance that results in scombroid poisoning if eaten. Keep mahi properly refrigerated and buy only from reputable vendors.

Scientific name: *Coryphaena hippurus*
Market name: Mahimahi
Common names: Dolphinfish, dorado

Mahimahi is the Hawaiian name for dolphinfish. The Hawaiian moniker came into common use to prevent consumers from confusing this fish with the marine mammal, to which it is unrelated. The alternative name of dolphinfish came about from the fish's habit of swimming ahead of sailing ships, as dolphins do. Mahimahi is one of the most beautiful fish in the ocean because of its rich, iridescent colors. The back is an electric greenish blue, the lower body is gold or sparkling silver, and the sides have a mixture of dark and light spots. Although most people associate mahimahi with Hawaii, it is found in tropical and subtropical waters around the globe. Initially, mahimahi was a bycatch of the tuna and swordfish fisheries. Today, a directed longline fishery targets mahi. "Clipper" is a term used to denote the highest-quality mahimahi, usually frozen at sea. Occasionally, mahimahi reach 50 pounds, but 5 pounds is the average market weight.

FLAVOR



TEXTURE

PRODUCT PROFILE

Mahimahi has a sweet, mildly pronounced flavor similar to swordfish. The lean meat is fairly firm in texture, though not steak-like, and it has large, moist flakes.

Darker portions of meat can be trimmed away for milder flavor. The raw flesh is pinkish to grayish-white, though dark along the lateral line. Cooked, the meat becomes off-white.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	100
Fat Calories	10
Total Fat	1 g
Saturated Fat	0 g
Cholesterol	80 mg
Sodium	100 mg
Protein	22 g
Omega-3	0.11 g

Source: Florida Bureau of Seafood & Aquaculture Marketing

Photo courtesy of Camera Hawaii and Hawaii Seafood Promotion Committee

COOKING TIPS

Mahi performs well on the grill. Though it is not an oily fish, the meat remains nicely moist and can hold up even to blackening. Mahi has a thick skin that should be removed before cooking.

Substitutions Grouper, Snapper

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole
- H&G
- Fillets

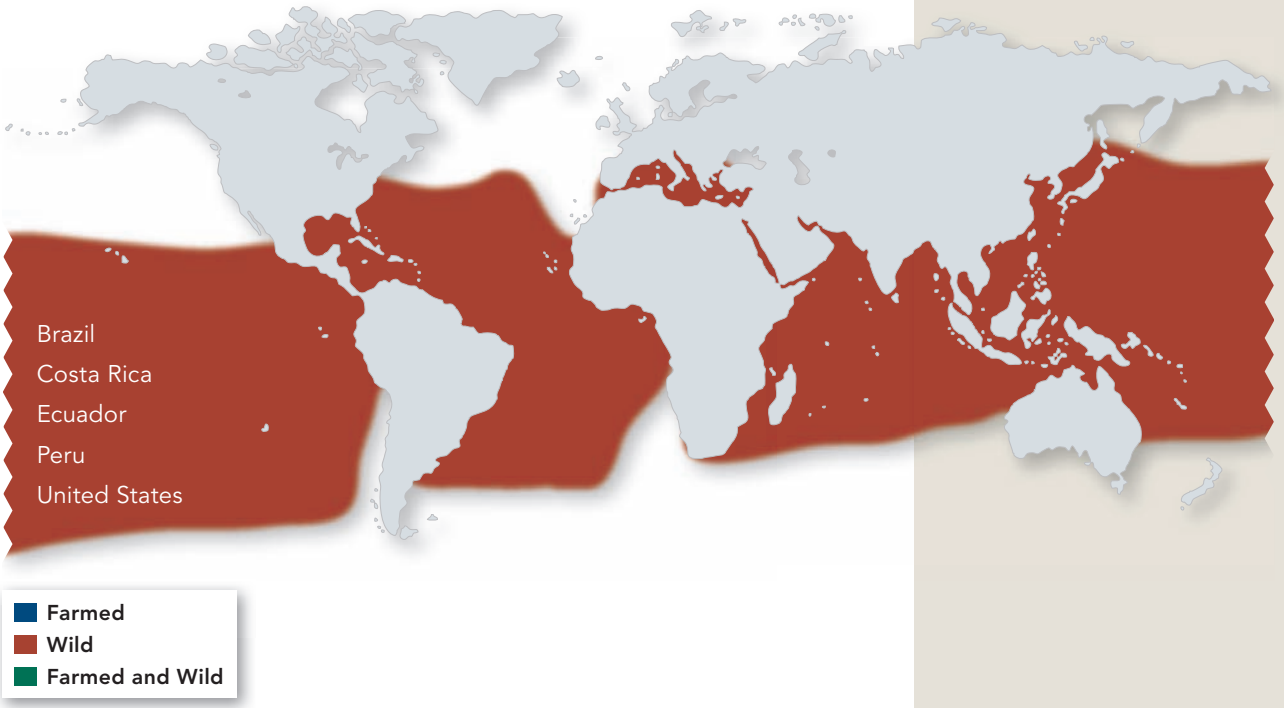
Frozen

- Fillets

Value-added

- Portions
- Smoked

GLOBAL SUPPLY



Marlin, blue

French	*Makaire bleu*
German	*Blauer Marlin*
Italian	*Marlin azzurro*
Japanese	*Makajiki*
Spanish	*Aguja azul*

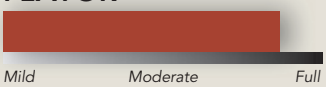
YOU SHOULD KNOW...

Fresh domestic marlin is generally more expensive than imported product, reflecting higher quality due to shorter trip times and better handling.

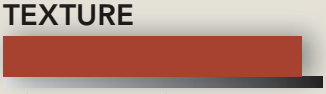
Scientific names: *Makaira nigricans; M. mazara*
Market name: Marlin
Common names: Blue marlin, sailfish, spikefish, boohoo, agika prieta; Pacific blue marlin, kajiki

A giant blue marlin was the Cuban fisherman's quarry in Ernest Hemingway's classic novella *The Old Man and the Sea*. The carcass of Santiago's marlin measured 18 feet in length. While blue marlins are the largest of the marlin species and prized by anglers for their fighting nature, the average landed size is 11 feet and from 200 to 400 pounds. Pacific blue marlin (*Makaira mazara*) are generally larger than the Atlantic strain; ancient Hawaiians feared the fierce fish, which they called *kajiki*, because a jab from its heavy bill could easily sink a fishing canoe. Known as a blue-water fish, since it spends most of its life at sea, the blue marlin is found in temperate and tropical waters worldwide. The popular gamefish is also taken incidentally in gillnets. In the Atlantic, U.S. commercial fishing vessels are prohibited from possessing blue marlin, but Hawaii has a commercial longline fishery for the species. Peak landings are from June to October.

FLAVOR



TEXTURE



PRODUCT PROFILE

Raw marlin flesh varies but is generally a light golden-orange when raw. It turns off-white when cooked, somewhat lighter than swordfish.

Marlin has a firm, meaty texture, similar to that of swordfish, and a rich, full flavor. There's a lot of tough, stringy connective tissue between the muscle layers in large marlin (150 pounds-plus), which can be avoided by buying smaller fish.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	155
Fat Calories	42
Total Fat	4.7 g
Saturated Fat	1.2 g
Cholesterol	49.4 mg
Sodium	115 mg
Protein	25.9 g
Omega-3	N/A

Source: University of Hawaii at Manoa

Photo courtesy of Camera Hawaii and Hawaii Seafood Promotion Committee

COOKING TIPS

Marlin steaks are ideal for simple, high-heat cooking methods like grilling or broiling. The rich taste can be savored with plain seasonings like salt and pepper or a squeeze of lime, and it also holds its own with more boldly flavored sauces, salsas or pungent herbs. Raw, top-quality marlin can be used for sashimi or seviche.

Substitutions Tuna, Swordfish

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- □ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

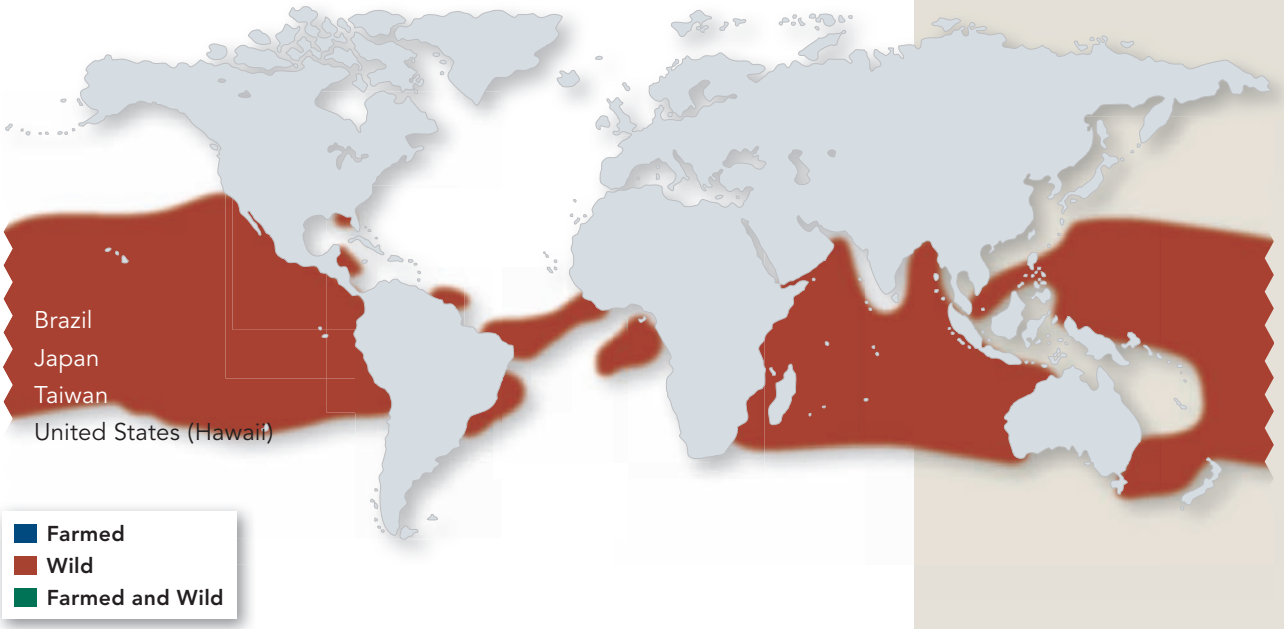
Fresh

- H&G
- Loins, skin on or off
- Fillets, skin on or off
- Steaks

Frozen

- Fillets
- Loins

GLOBAL SUPPLY



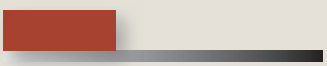
Moi

French	*Barbure ou capitaine*
German	*Fingerfisch*
Japanese	*Nanyo-Agonashi, Tsubamekonoshiro*
Spanish	*Barbudo seis barbas, Pez barbita del pacifico*

YOU SHOULD KNOW...

As a farmed fish, moi offers consistent quality, size and year-round availability. Supplies are limited but will increase as fledgling farming operations boost production and value-added products are developed.

FLAVOR



TEXTURE

Scientific name: *Polydactylus sexfilis*
Market name: Moi
Common names: Pacific threadfin, Hawaiian moi

Historically, in Hawaii moi was a delicacy reserved for male royalty; commoners caught eating the fish faced severe punishment. Hence moi's unofficial title as "the fish of kings." While Westernization ended the prohibition on moi, access to the fish was limited due to depletion of the wild stock. Stock-enhancement programs through the 1990s rebuilt the sport fishery for moi; commercial fishing is still virtually nonexistent. However, more people in Hawaii and on the mainland are enjoying this fish today, thanks to aquaculture operations. Hawaii's Oceanic Institute provides the stock for moi farmers throughout the state who market the fish at sizes of 3/4 to 1 1/2 pounds. The primary aquaculture operation in Hawaii raises moi in open-ocean, submerged cages. Smaller-scale farmers use seawater tanks, raceways or ponds for raising the fish. Farmed moi are harvested, iced and delivered within hours to domestic (Hawaii and mainland United States) and international markets.

PRODUCT PROFILE

Moi flesh is white to light gray and cooks up white. The rich, mild-flavored meat is moist, tender and flaky.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	122
Fat Calories	37
Total Fat	4.1 g
Saturated Fat	1.4 g
Cholesterol	69 mg
Sodium	73 mg
Protein	21.1 g
Omega-3	N/A

Source: Oceanic Institute, Nutrition Dept., Hawaii (2004)
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

COOKING TIPS

Moi has a relatively high oil content that keeps the meat moist in a variety of preparation methods. Steam or bake whole fish or sear fillets, skin-side down, in a pan. Moi can also be grilled, broiled or pan fried and served raw as sashimi. The oil in the flesh makes smoking an option as well.

Substitutions Black sea bass, Hybrid striped bass

PRIMARY PRODUCT FORMS

Fresh
- Whole
- Dressed
- Fillets

Frozen (rarely)
- Whole
- Dressed

GLOBAL SUPPLY

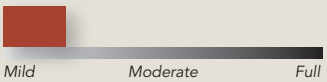
Monkfish

French	*Baudroie d'Amérique*
German	*Angler*
Italian	*Rana pescatrice*
Japanese	*Anko*
Spanish	*Rape*

YOU SHOULD KNOW...

Before cooking, be sure to remove the blue-gray membrane covering the fillet. If left on, the membrane will shrink and make the meat tough and unpalatable.

FLAVOR



TEXTURE

Scientific name:	*Lophius americanus*
Market name:	Monkfish
Common names:	Monkfish, anglerfish, goosefish, bellyfish

By all accounts, monkfish is one of the ugliest fish in the deep, having a huge head, tiny eyes and an enormous mouth filled with needle-like teeth. On top of that, to lure other fish into its grotesque mouth, it is equipped with a peculiar apparatus that looks like a spike with a bit of meat on it, which it waves back and forth to entice its prey. Obviously not intended for the display case, the whole fish rarely makes it ashore, since fishermen generally remove the tail and liver at sea and throw the rest back. Tail meats range from 1 to 4 pounds. Most of the livers are exported to Japan, where they are used in soup. Monkfish are found worldwide, but the primary harvesting areas are in the North Atlantic from coastal Norway to the Mediterranean and from the Grand Banks to North Carolina. U.S.-landed monks are taken by trawlers and gillnets and as bycatch from scallop draggers.

PRODUCT PROFILE

Monkfish has a mild, slightly sweet taste. The tail meat, the only part of the fish that is used, is firm, dense and boneless. It doesn't flake readily and is firm like scallop or lobster meat.

The raw flesh is off-white to pale gray, covered with a blue-gray membrane; cooked meat is white. With headless monkfish, blood is a sign of a recently caught fish. Dried up or brown-colored blood indicates a fish that's started to age. Don't accept tails when the edges of the meat are discolored or there's a fishy odor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	76
Fat Calories	14
Total Fat	1.5 g
Saturated Fat	0.3 g
Cholesterol	25 mg
Sodium	180 mg
Protein	14.5 g
Omega-3	N/A

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

COOKING TIPS

Mild yet very firm, monkfish is highly versatile and benefits from zesty marinades, seasonings and sauces. The firm texture of monkfish means you don't have to worry about the meat falling apart on the grill or in chowders. Buy slightly larger fillets than for other fish, because the meat loses moisture and shrinks when cooked. Use poached monkfish to stretch a lobster salad (the monk is known as "the poor man's lobster").

Substitutions Halibut, Lobster meat, Scallops

PRIMARY PRODUCT FORMS

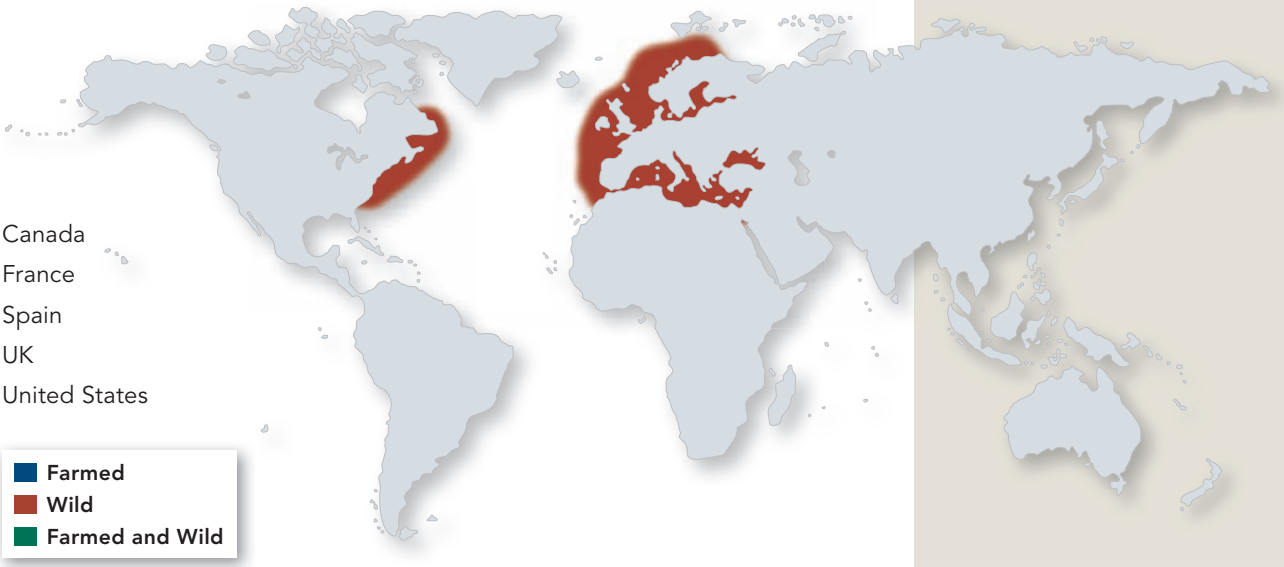
Fresh

- Whole (head on)
- Tail fillets (skinless)
- Whole tails (skin-on)

Frozen

- Tail fillets (skinless)
- Whole tails (skin-on)

GLOBAL SUPPLY



Mullet

French	*Mulet cabot*
German	*Meeräsche*
Italian	*Cefalo mazzone*
Japanese	*Bora*
Spanish	*Mújol*

YOU SHOULD KNOW...

Mullet is best purchased in the fall, just before the offshore spawning migration, when the meat is at its fattest and fish are full of ripe roe.

Scientific name: *Mugil cephalus*
Market name: Mullet
Common names: Striped mullet, black mullet, gray mullet

More than 100 species of mullet are found worldwide in estuaries and the open ocean. In the United States, particularly in Southeast regional cuisine, the striped mullet is the species of choice, prized as much for its roe as for its flesh. The red roe is a valuable export product for markets in Japan and Taiwan. Striped mullet are found from North Carolina to Texas. Florida accounts for most of the U.S. commercial harvest, which has been decimated by net bans. Despite its popularity in the Southeast, striped mullet remains fairly unknown in the rest of the country. Quality is dependent on freshness, so most mullet is consumed in the region where it's landed. Don't confuse striped mullet with the renowned red mullet, or rouget, of French cuisine; the red mullet (*Mullus surmeletus*) is a member of the goatfish family Mullidae, while the striped mullet is in the Mugilidae family.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

Mullet has a rich, nutty taste. Its high oil content and flavor have earned it the nickname "Biloxi bacon." The raw flesh is white and cooks up white, firm and juicy. A dark, lateral line of fatty flesh runs through the meat and can impart a stronger flavor. To prevent this, skin the fish and remove the line.

Because mullet is oily, careful handling and fast turnover are necessary; even frozen, the shelf life is just 90 days.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	117
Fat Calories	34
Total Fat	3.8 g
Saturated Fat	1.1 g
Cholesterol	49 mg
Sodium	65 mg
Protein	19.4 g
Omega-3	0.4 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING TIPS

The high oil content of mullet makes it a good candidate for charcoal grilling and hot smoking. Floridians and Cajuns split mullet and roast it over hickory fires. It can also be stuffed and baked or pan-fried. For a milder flavor, skin fillets before cooking. In European-style recipes that specify mullet, don't use the domestic species; substitute ocean perch, unless you have access to true European red mullet.

Substitutions Mackerel, Pompano

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- □ Broil
- ■ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

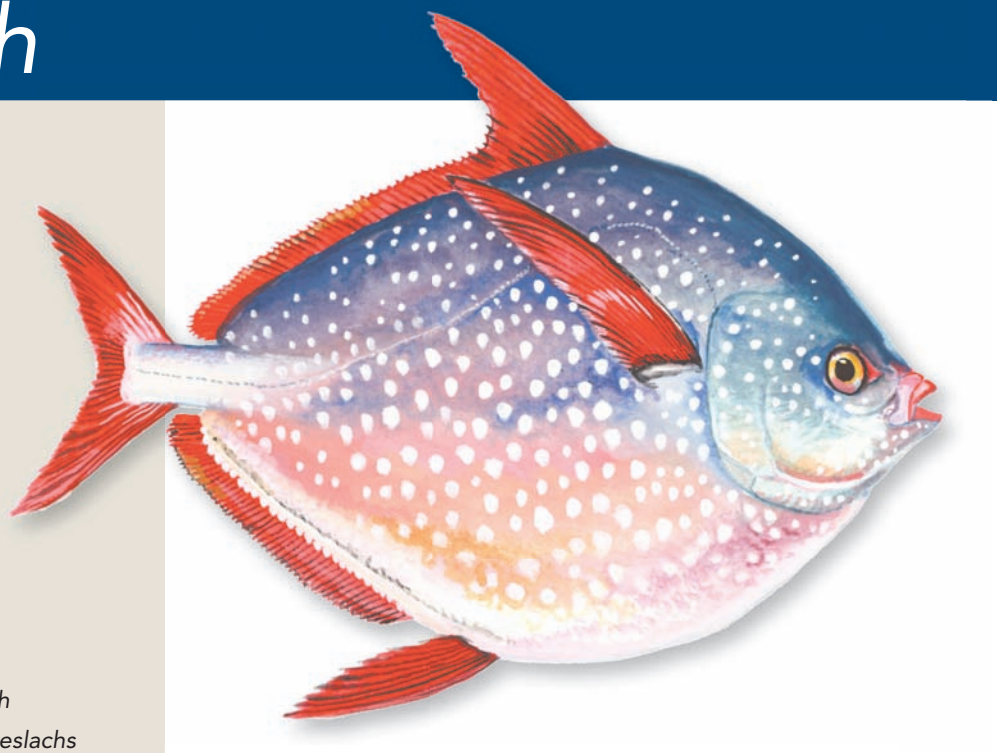
PRIMARY PRODUCT FORMS

Fresh
- Whole
- H&G
- Fillets

Frozen
- Whole
- H&G
- Fillets

Value-added
- Smoked
- Roe

Opah



French	*Opah*
German	*Gotteslachs*
Italian	*Pesce re*
Japanese	*Mandai*
Spanish	*Luna real*

Scientific name: *Lampris guttatus*
Market name: Opah
Common names: Moonfish, Hawaiian moonfish

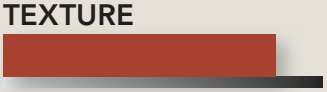
YOU SHOULD KNOW...

Size is the tip-off that you're getting Hawaiian opah. Racks, or fresh H&G fish, from Hawaii average 45 pounds. Racks from New Zealand and Australia run below 30 pounds and have duller, softer meat.

Years ago, opah was thought to bring good luck, and Hawaiian fishermen gave the fish away as a goodwill gesture. But there was also a time when seafood suppliers could find no takers for the moonfish, likely named for its round profile. Opah's popularity finally blossomed in the late '80s when the state of Hawaii started promoting its underutilized species, and U.S. consumers acquired a taste for more boldly flavored fish. Opah isn't consistently available, since the species doesn't school and isn't easily harvested in quantity. While known primarily as a Hawaiian species in the domestic market, opah is found worldwide in tropical and temperate waters. It is often taken as bycatch by longliners targeting tuna from New Zealand to California and also is harvested off the California coast. Opah is imported into the U.S. market predominately from Fiji, Tahiti and New Zealand when domestic supplies are low. In earlier scientific references, opah was classified as *Lampris regius*.

FLAVOR

TEXTURE



PRODUCT PROFILE

One opah has four types of flesh, each a different color. The tender meat of the loin, which runs along the backbone from eye to tail, is a light salmon-orange. The less-tender, stringy side flesh is the same color as the loin at the top but becomes paler at the bottom. The cheek meat is dark red. All cook up white except for the bright-red breastplate meat, which turns brown.

Opah has a rich, creamy taste and firm, fatty texture. The flavor is a cross between tuna and swordfish — distinctive but not overpowering.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	112
Fat Calories	17
Total Fat	1.9 g
Saturated Fat	N/A
Cholesterol	N/A
Sodium	N/A
Protein	23.6 g
Omega-3	0.4 g

Source: University of Hawaii at Manoa

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

The opah's large-grain, fatty flesh offers a versatility of use that appeals to chefs. It also works well with assertive sauces. The loin yields steak-like fillets that are good for grilling, broiling or sautéing. Opah top loin meat makes excellent sashimi. The rest is too fibrous to be good raw but becomes very tender when cooked.

Substitutions Tuna, Swordfish

GLOBAL SUPPLY

Australia
Fiji
New Zealand
Tahiti
United States

COOKING METHODS

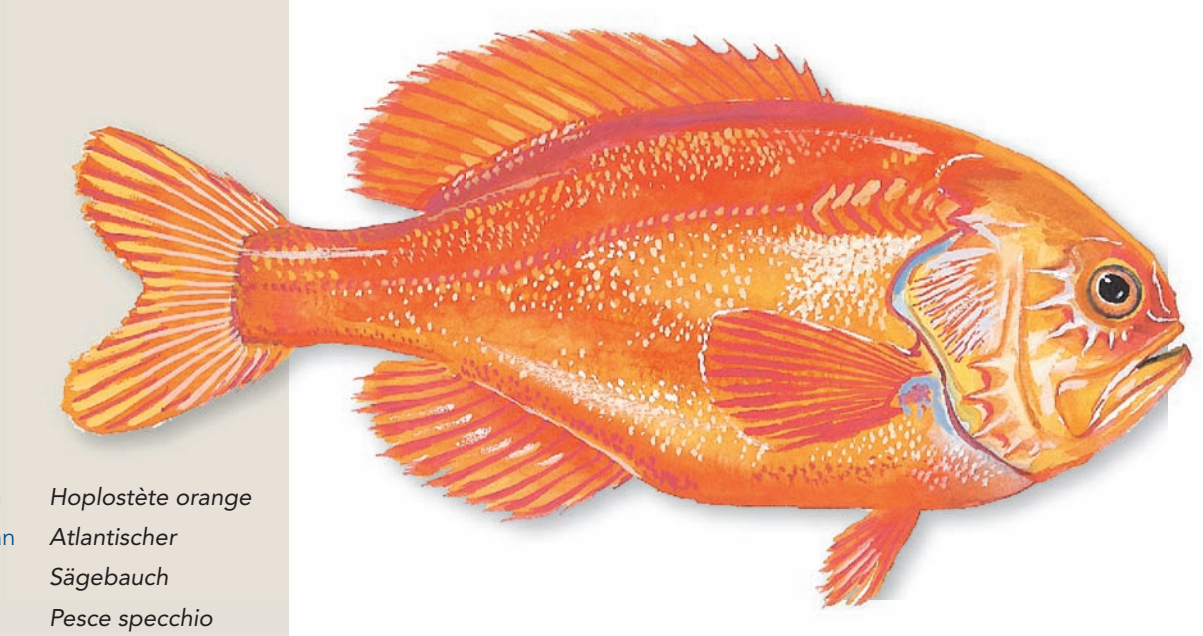
- ☐ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- ☐ Poach
- ■ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh
- Fillets
- Loins
- Whole

Frozen (rarely)
- Fillets

Orange roughy



French	*Hoplostète orange*
German	*Atlantischer Sägebauch*
Italian	*Pesce specchio atlantico*
Japanese	*Hiuchidai*
Spanish	*Reloj anaranjado*

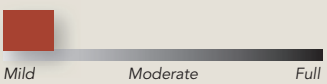
YOU SHOULD KNOW...

The fat beneath the skin of orange roughy contains a partially indigestible oily wax, called wax ester. Roughy fillets should always be deep-skinned to remove this subcutaneous layer.

Scientific name: *Hoplostethus atlanticus*
Market name: Orange roughy
Common names: Orange roughy, red roughy

This species was first fished commercially off New Zealand, and then later off of Australia. It was the New Zealanders who launched the marketing effort for the fish formerly known as slimehead — a distinct marketing handicap. After the Kiwis persuaded the Food and Drug Administration to allow use of the name orange roughy, it soon become New Zealand's most valuable finfish species. The fish is distinctive, with its bright-orange skin, spiky fins and bony head. Orange roughy averages 3 1/2 pounds, and the fillet size is generally 6 to 8 ounces. Roughy is a deepwater species taken by trawls at depths of up to 700 fathoms. In such a cold and pressurized environment, mating is not a frequent activity. Additionally, the average age of roughy caught in commercial fishing nets is from 30 to 50 years, which translates into a slow replacement rate and a high susceptibility to overfishing.

FLAVOR



TEXTURE

PRODUCT PROFILE

Orange roughy has a mild, delicate flavor and moist, large-flaked meat that holds together well after cooking. Raw orange roughy flesh is pearly white, and it cooks up to an opaque white.

The skin side of the fillets often sports a faint, orange-brown band of color. With roughy, the darker the meat, the lower the quality.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	69
Fat Calories	6.3
Total Fat	0.7 g
Saturated Fat	0.02 g
Cholesterol	20 mg
Sodium	63 mg
Protein	14.7 g
Omega-3	0.02 g

Source: USDA

Photo courtesy of New Zealand Seafood Industry Council

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

Fillets (skinless/boneless)

Frozen (most common)

Fillets (skinless/boneless)

Value-added

Blocks

Breaded

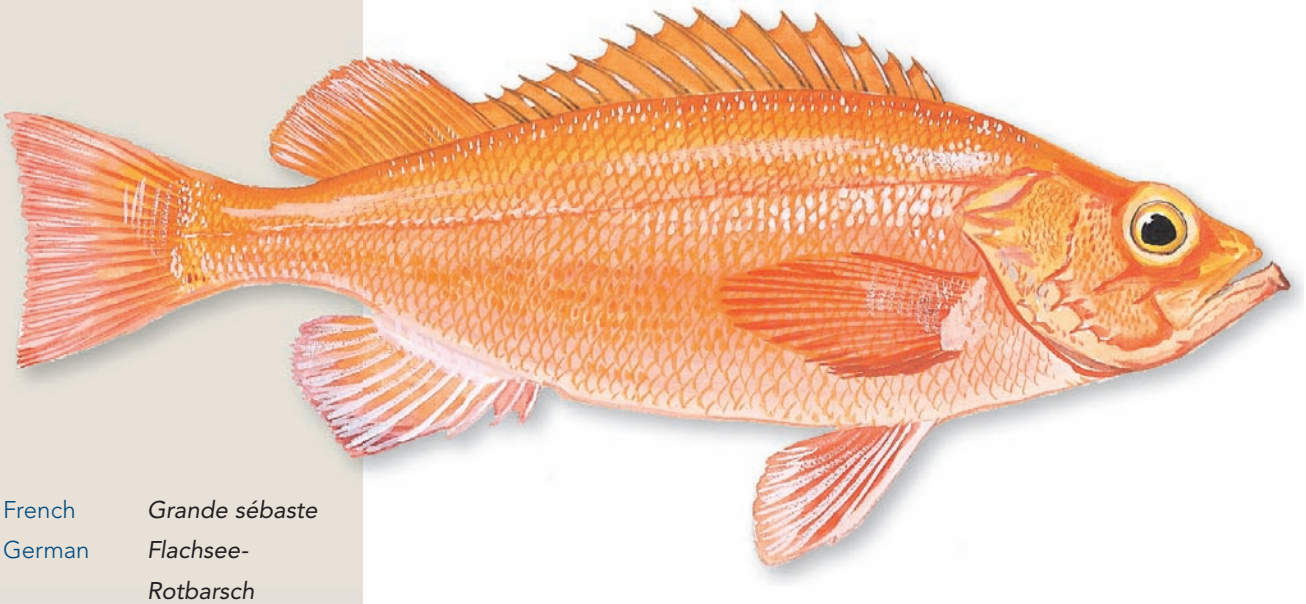
COOKING TIPS

The meat of the orange roughy is tolerant of most cooking methods, except deep frying and grilling, and works well with almost any seasoning or sauce. Orange roughy has a moderate oil content, which helps the meat retain moisture during cooking. Though some product is frozen twice (once aboard the boat and again after skinning and filleting), roughy maintains its quality remarkably well if frozen properly.

Substitutions Ocean perch, Cod, Haddock

GLOBAL SUPPLY

Perch, Atlantic ocean



French	*Grande sébaste*
German	*Flachsee-Rotbarsch*
Italian	*Sebaste*
Japanese	*Menuke*
Spanish	*Gallineta*

YOU SHOULD KNOW...

Though Atlantic ocean perch is usually sold with the skin on, the meat will have a longer shelf life if both the skin and fat layer beneath it are removed.

Scientific name: *Sebastes marinus*
Market name: Ocean perch
Common names: Ocean perch, redfish, rosefish, deep-sea perch

Although the Pacific Ocean claims over 50 species in the *Sebastes* genus, the Atlantic has only one ocean perch, a slow-growing, deep-water fish with bright-red or orange-red coloring. Atlantic ocean perch are not actually perch. They're rockfish that travel in large schools. They are called redfish in New England and eastern Canada and should not be confused with redfish from the Gulf of Mexico, which are drums. Ocean perch is a leading retail product in the Midwest, where the name "perch" is an easy sell because of its freshwater connotation. Atlantic ocean perch are found in offshore waters of the Atlantic from southern Labrador to the Gulf of Maine and on the other side of the Atlantic off Germany, Denmark, Iceland and Norway. Most Atlantic ocean perch are trawl-caught and weigh up to 5 pounds, though market weights typically range from 1 1/2 to 2 pounds.

FLAVOR

TEXTURE

PRODUCT PROFILE

Ocean perch is mild tasting yet a bit sweet, with a moderately firm texture. The meat is lean, moist and flaky. Large ocean perch develop a coarse texture. Deep-skinned ocean perch with the fat line removed has the most delicate flavor. The flesh is white, though not as light as cod, and it turns opaque white when cooked.

Whole fish may have bulging eyes and distended air bladders, which is a result of being brought up from great depths, not an indication of poor quality.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	94
Fat Calories	14.4
Total Fat	1.6 g
Saturated Fat	0.2 g
Cholesterol	42 mg
Sodium	75 mg
Protein	18.6 g
Omega-3	0.3 g

Source: USDA
Photo courtesy of Icelandic USA

COOKING TIPS

In Asian cuisine, ocean perch is often served whole, either steamed or deep fried. To cook whole, gut and gill the fish first. The firm texture of ocean perch makes it also suitable for soups, chowders and stews, and its flavor will hold up to a variety of sauces. Fillets hold together best with the skin on, though the flavor will be more pronounced.

Substitutions Rockfish, Snapper, Orange roughy

GLOBAL SUPPLY

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

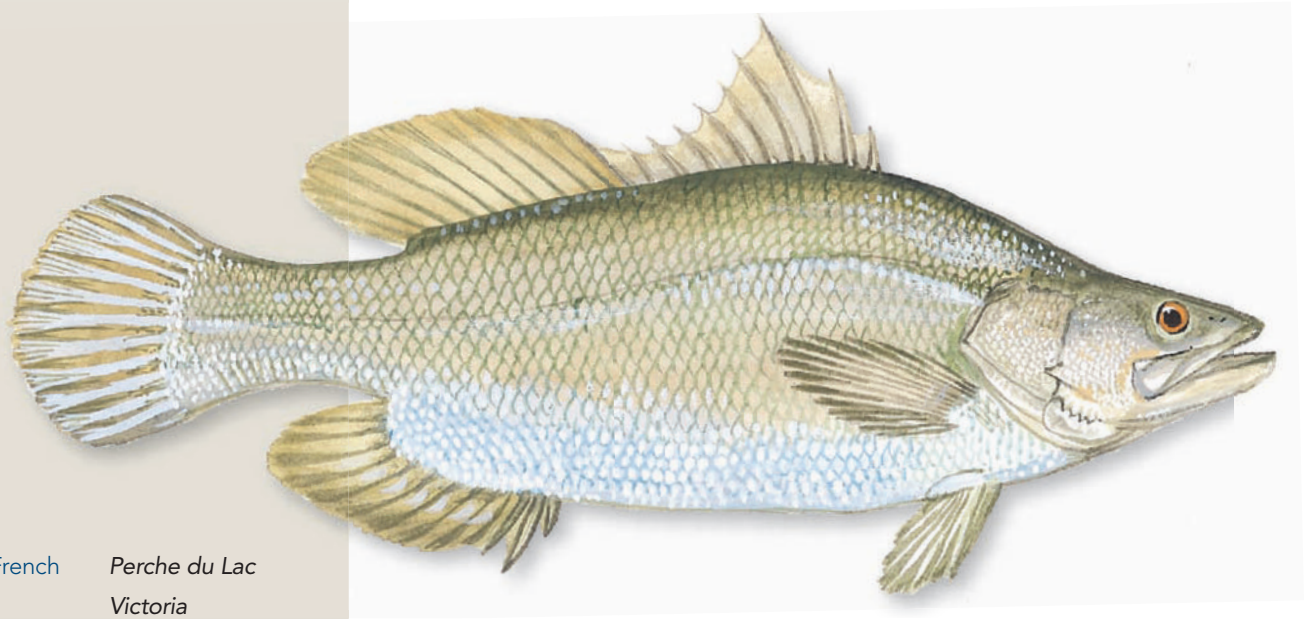
PRIMARY PRODUCT FORMS

Fresh
- Whole
- H&G
- Fillets

Frozen
- Whole
- H&G
- Fillets
- Blocks

Value-added
- Breaded/battered
- Frozen portions

Perch, Lake Victoria

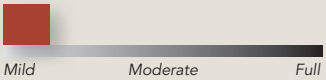


French	*Perche du Lac Victoria*
German	*Victoriabarsch*
Italian	*Pesce di Lago Victoria*
Japanese	*Bikutoriakopachi*
Spanish	*Perca del Lago Victoria*

YOU SHOULD KNOW...

Unless your customers like strong-flavored fish, opt for smaller sizes of Lake Victoria perch, and make sure they've been deep-skinned to completely remove the fat layer.

FLAVOR



TEXTURE

Scientific name: *Lates niloticus*
Market name: Nile perch
Common names: Nile perch, Lake Victoria perch

Formerly called Nile perch, Lake Victoria perch is a freshwater fish found in central Africa's lakes and rivers. Lake Victoria, roughly the size of South Carolina and with 2,000 miles of shoreline, claims the largest population of this species. The fish originated in the Nile River — hence its original market name — but in the 1960s, the British introduced the perch to the lake to curb the growth of other species and develop a sport fishery. The huge, carnivorous perch has since all but taken over Lake Victoria, decimating some 350 species of native fish in the process, and now supports a substantial commercial fishery. Like many species found in Africa, Lake Victoria perch is enormous, reaching 300 pounds and 6 feet in length. It is said to be the largest freshwater fish in the world. Commercial sizes, however, range from 6 to 14 pounds. The fish are harvested by small boats working close to shore with gillnets and longlines.

PRODUCT PROFILE

With big fillets and a meaty texture, Lake Victoria perch reminds many people of sea bass and grouper. The fish is mild flavored, and the moist, medium-firm cooked meat has a good flake. Lake Victoria perch is rich in healthful omega-3 oils.

The raw meat has a pinkish, flesh-toned tint, but it cooks up snow white. Look for Lake Victoria perch that's been deep-skinned, leaving no residual fat. Otherwise, the meat color will be affected, and the meat will spoil sooner. Red flesh indicates skinning wasn't deep enough; yellowing is an indication of rancidity.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	91
Fat Calories	10.8
Total Fat	1.2 g
Saturated Fat	0
Cholesterol	89.4 mg
Sodium	61.2 mg
Protein	20 g
Omega-3	N/A

Source: Try-Foods International
Photo courtesy of Beaver Street Fisheries

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [x] Smoke
- [ ] Steam

COOKING TIPS

Lake Victoria perch is "family friendly," with only small pinbones that are easily removed. With its high oil content, Lake Victoria perch is also very forgiving, as it remains moist during cooking. The oil content makes it a good candidate for smoking. Despite its mild flavor, the fish works well with strong ethnic seasonings and sauces.

Substitutions Catfish, Sea bass, Grouper

PRIMARY PRODUCT FORMS

Fresh
- H&G
- Fillets (boneless, skin-on/skinless)
- Fillet portions

Frozen
- Fillets (boneless, skin-on/skinless)
- Fillet portions

Value-added
- Smoked

GLOBAL SUPPLY

Perch, Yellow

French	*Perche canadienne*
German	*Amerikanischer Flussbarsch*
Italian	*Persico dorato*
Spanish	*Perca*

YOU SHOULD KNOW...

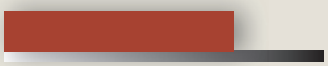
Since it is a small, lean, short-lived species, yellow perch contains very low levels of PCBs.

Scientific name: *Perca flavescens*
Market name: Yellow perch
Common name: Ring perch, striped perch, jack perch, redfin

Hailed by many as "the ultimate pan fish," yellow perch is rivaled only by walleye as the most popular freshwater fish on restaurant menus. The perch are typically 6 to 10 inches long and weigh 1/2 to 1 pound. The species was one of the most important Great Lakes fisheries until the 1990s, when over-fishing and environmental degradation decimated stocks by as much as 80 percent. Today, commercial wild fisheries are limited to Canada and a few U.S. sites. However, the fish has adapted well to pond culture and intensive tank rearing. Thanks to successful aquaculture, the yellow perch supply, once seasonally limited, is now strong year-round, keeping pace with rapidly growing demand among U.S. diners. An estimated 40 aquaculture operations in the United States raise yellow perch to food size. Most commercially available yellow perch are now farmed, with wild fish accounting for just a small percentage of annual sales. The top yellow perch farming states are Wisconsin, Ohio and Indiana. Most commercial wild supplies are from the Lake Erie region, with Canadian fisheries dominating.

FLAVOR

TEXTURE



PRODUCT PROFILE

Fresh perch has moist, translucent, deep-pink flesh with no fishy odor. Cooked, the lean meat is white, with a mild, sweet flavor and firm but flaky texture.

Although farmed fish have a higher fat content and lower protein level than wild, the taste is essentially identical.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	91
Fat Calories	8.1
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	90 mg
Sodium	62 mg
Protein	19.4 g
Omega-3	0.3 g

Source: USDA

Photo courtesy of Bell Aquaculture © 2008

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

Skin-on fillets

Whole

Frozen

Skin-on fillets

Whole

Value added

Breaded/battered fillets

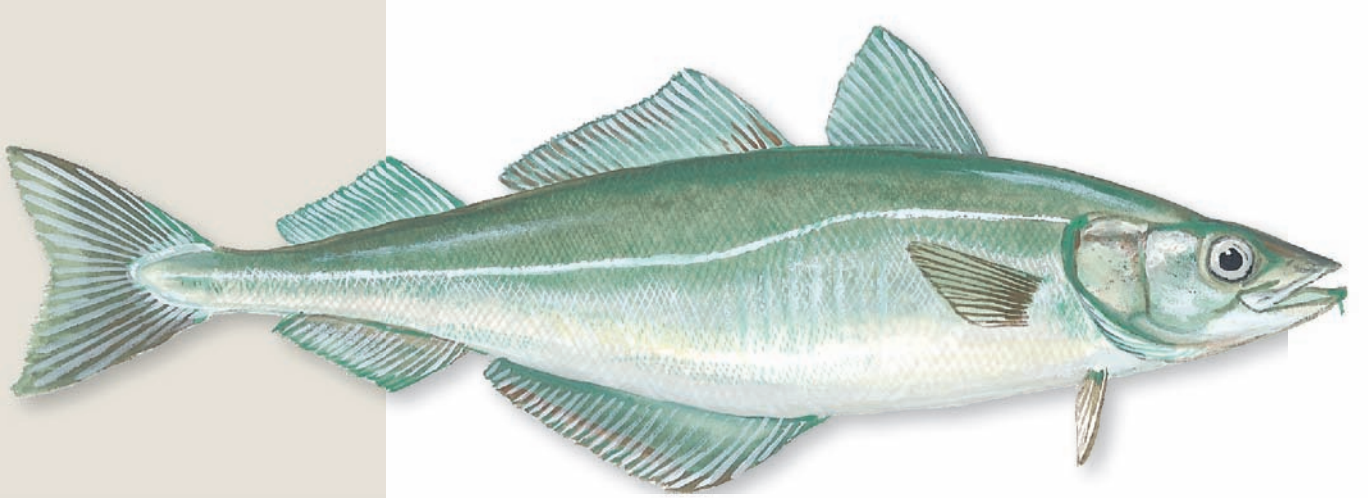
COOKING TIPS

Highly versatile, yellow perch can be pan- and deep-fried, baked, sautéed, poached, grilled or used in chowder. For most recipes, prepare skin-on. Avoid overcooking to keep the flesh moist. Because of its mild but distinctive flavor, yellow perch can be prepared with minimal seasoning. It lends itself equally well to light treatments — sautéing and topping with artichoke hearts or cucumber sauce, for example — and heartier recipes, such as baked-stuffed or battered and deep-fried.

Substitutions Walleye, Snapper, Cod

GLOBAL SUPPLY

Pollock, Alaska



French	*Morue du Pacifique occidental*
German	*Pazifischer Pollack*
Italian	*Merluzzo dell'Alaska*
Japanese	*Suketôdara*
Spanish	*Abadejo de Alaska*

YOU SHOULD KNOW...

Alaska pollock shouldn't be confused with the two pollocks of the Atlantic, Pollachius pollachius and P. virens, a.k.a. saithe.

Scientific name: *Theragra chalcogramma*
Market names: Pollock, Alaska pollock
Common names: Walleye pollock, Pacific tomcod, Pacific pollock, Alaska pollock

Alaska pollock is a member of the cod family, reflected by some of its other names: bigeye cod, snow cod and tomcod. Once dismissed as cod's poorer cousin, the pollock has come into its own as a valuable resource, a global commodity and a popular item (credited or not) on menus around the world. Alaska pollock is among the most ubiquitous of North Pacific groundfish, ranging from California to Alaska and across the Aleutians to the waters of Russia, China and Japan. The bulk of the catch comes from the Bering Sea, the Gulf of Alaska and Russia's Sea of Okhotsk. In the United States, pollock are harvested by factory trawlers that process at sea and by catcher boats that deliver to shore-based processors. Many operations produce both surimi and single-frozen block products from pollock. Alaska pollock weigh 1/2 to 2 pounds and average 12 to 20 inches in length. Fillets average 2 to 3 ounces. Larger fillets of 4 to 6 ounces are available in the fall.

FLAVOR

TEXTURE

PRODUCT PROFILE

Pollock is a mild, delicate-tasting fish, with a slightly coarse texture. Some find it more flavorful than cod or haddock, perhaps because it has a higher oil content. Boneless Alaska pollock fillets are creamy tan in color. Cooked, the lean, moist meat is white and firm, with a nice flake.

If you need a white fillet, your odds are much better with single-frozen vs. twice-frozen pollock, which is often grayer. Additionally, deep-skinned (i.e., fat line removed) pollock offers a whiter, more "cod-like" portion.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	81
Fat Calories	7.2
Total Fat	0.8 g
Saturated Fat	0.2 g
Cholesterol	71 mg
Sodium	99 mg
Protein	17.2 g
Omega-3	0.4 g

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING TIPS

While this versatile whitefish is commonly used in surimi and fried-fillet sandwiches, it can hold its own in gourmet preparations. Alaska pollock is an ideal substitute for cod, though pollock fillets are smaller. Because of the higher fat content, it should be cooked slightly longer than cod or haddock. Pollock's delicate taste is easily complemented with herbs, spices and light sauces.

Substitutions Cod, Haddock, Flounder

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- □ Grill
- □ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

- H&G
- Fillets (boneless, skin-on/skinless)

Frozen

- H&G
- Fillets (skinless, boneless)
- Blocks (minced; whole fillets)

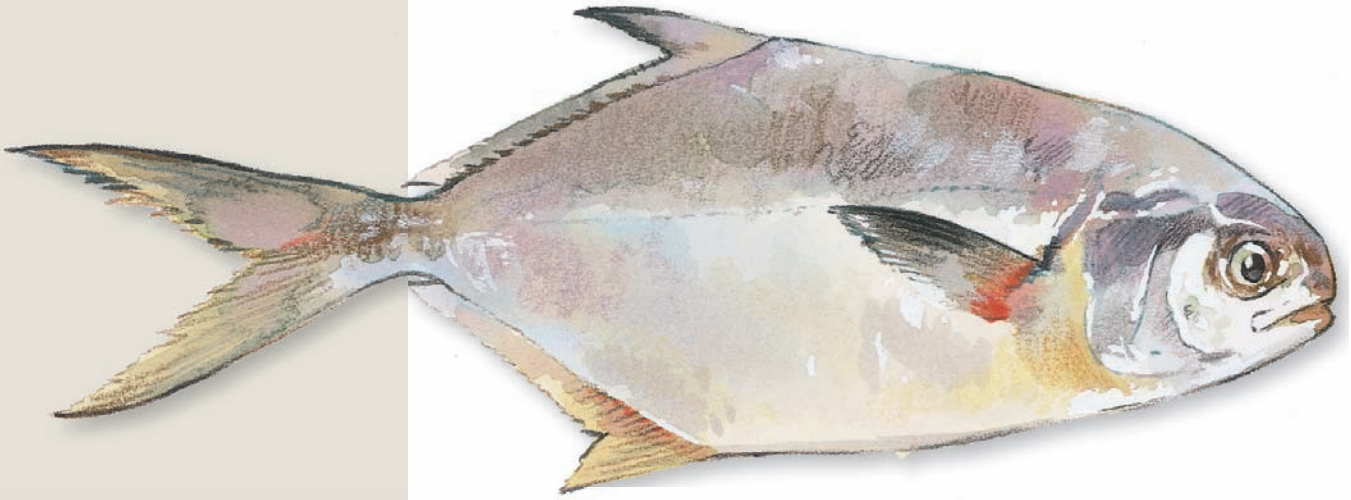
Value-added

- Breaded/battered portions
- Nuggets
- Surimi
- Prepared entrées

GLOBAL SUPPLY

Japan
Korea
Russia
United States

Pompano



French	*Pampano*
German	*Gabelmakrele*
Italian	*Leccia stella*
Japanese	*Kobanaji*
Spanish	*Palometa*

YOU SHOULD KNOW...

Real pompano is sold fresh, in the round; it is not available as fillets. It is seldom sold frozen, though pompano freezes very well and retains its flavor and texture nicely.

Scientific name: *Trachinotus carolinus*
Market name: Pompano
Common names: Florida pompano, common pompano, Atlantic pompano, sunfish, butterfish

Gourmands describe the Atlantic pompano as "the world's most edible fish." The flat-bodied, pan-sized pompano is easy to eat whole, a form that shows off the beautiful, silvery skin. The species is harvested from Virginia to Texas, but primarily off Florida's west coast. Commercial landings are limited, and as a result, prices remain high in most markets. This makes the pompano a tempting target for substitution — and an easy one, since there are several different species of pompano within the confusing Carangidae, or jack, family. The star of the clan, the Atlantic pompano, is often confused with three less delectable relatives: the similar-looking permit, the palometa and the gafftopsail pompano. But it's not that difficult to tell the real McCoy: Any fish bigger than 3 pounds can be eliminated, since market-sized pompano average 2 pounds.

FLAVOR

TEXTURE

PRODUCT PROFILE

Though technically a round fish, the narrow-bodied pompano is structured much like a flatfish and generally weighs less than 3 pounds. The attractive, silvery skin is edible and does not require scaling.

Pompano meat is firm but finely flaked, with a sweet, mild flavor. The flesh is pearly white, with a moderate fat content, and cooks up white.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	164
Fat Calories	85
Total Fat	9.5 g
Saturated Fat	3.5 g
Cholesterol	50 mg
Sodium	65 mg
Protein	18.5 g
Omega-3	0.6 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

Head-on, gutted

H&G

Frozen

H&G

COOKING TIPS

Pompano lends itself to whole preparations since it is easy to eat off the bone. It can also be halved lengthwise to produce two long fillets. When serving, try to display the attractive skin. The simplest way to prepare pompano is to broil it with lemon and butter. Perhaps the most famous preparation for this fish is en papillote (cooked in parchment).

Substitutions Flounder, Snapper, Mahimahi

GLOBAL SUPPLY

Porgy

French	*Pagre commun*
German	*Sackbrasse*
Italian	*Pagro*
Japanese	*Yoroppa-madai*
Spanish	*Pargo*

YOU SHOULD KNOW...

Be careful that porgy isn't substituted for the higher-valued sea bream known as daurade in Europe.

Species name: *Pagrus pagrus*
Scientific name: Porgy
Common names: Red porgy, pink porgy, sea bream, silver snapper

The name "porgy" comes from an American Indian name meaning "fertilizer," a common use for these abundant fish during Colonial times. While porgy is the preferred name for the species in the United States, where it is sold mainly in ethnic markets, in Europe it is called sea bream. About 15 species of porgy, including members of the Sparidae family of sheepshead and scup, are found on the American side of the Atlantic. They range in size from 1/2 pound to 20 pounds, though market-sized fish weigh 3 pounds or under. The largest is the red porgy (*P. pagrus*), found on both sides of the Atlantic Ocean. It is caught by hook and line and trawls and is also a popular recreational fish in the United States. Argentina is the world's major red porgy producer and sells frozen fish to markets in Europe, where the fish is highly regarded. Uruguay and Brazil also have commercial red porgy fisheries.

FLAVOR

TEXTURE

PRODUCT PROFILE

Red porgy has white, tender meat with a large flake and mild, sweet flavor. It has been compared to snapper in taste and texture.

Porgies contain lots of small bones, which makes them difficult to fillet.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	124
Fat Calories	46
Total Fat	5.1 g
Saturated Fat	N/A
Cholesterol	N/A
Sodium	N/A
Protein	19.6 g
Omega-3	0.8 g

Source: *Illustrated Multilingual Guide to the World's Commercial Warmwater Fish* by Clauds Frimodt, 1995. This material is reproduced with permission of John Wiley & Sons, Inc.
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Porgy is a versatile fish that can be used in many preparations, and its mild flavor works well with a variety of flavor accents. Dressed fish and steaks can be stuffed and baked. Whole fish are good cooked on the grill or oven roasted; these methods soften the bones and allow the meat to slide off them more easily. Porgies can have tough, hard-to-scale-skin. It's easiest to have the fish scaled before buying.

Substitutions Snapper, Croaker, Grouper

GLOBAL SUPPLY

Argentina
Brazil
Greece
Spain
Turkey
United States
Uruguay

COOKING METHODS

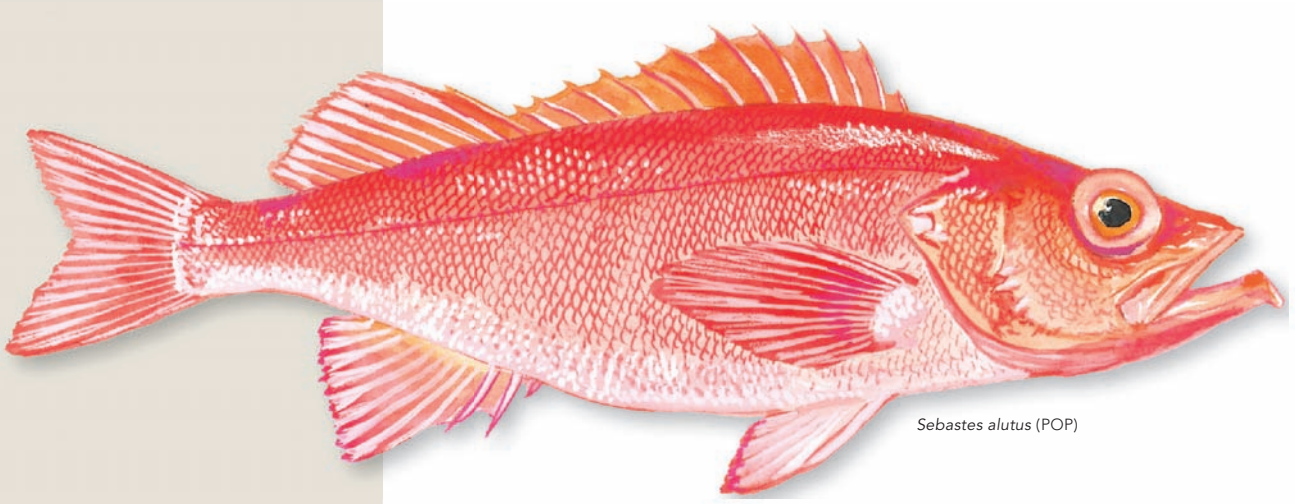
- [x] Bake
- [ ] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh
- H&G
- Head-on, gutted
- Fillets

Frozen
- H&G
- Fillets
- Blocks

Rockfish



Sebastes alutus (POP)

French	*Racasse du nor*
German	*Rotbarsch*
Italian	*Sebaste*
Japanese	*Menuke*
Spanish	*Gallineta*

YOU SHOULD KNOW...

Whole rockfish may have bulging eyes and distended air bladders as a result of being brought up from great depths. This is not an indication of poor quality.

Scientific name: *Sebastes* spp.
Market name: Rockfish
Common names: Pacific red snapper, rock cod, black bass, Pacific ocean perch, POP, widow rockfish, canary rockfish, chilipepper, thorny head

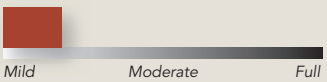
You'd be hard pressed to find a group of fish with more harvest methods, real names and aliases than the *Sebastes* genus. The 70 or so fish in this family range from the Bering Sea to Baja California. Many take their common names and nicknames from their skin color: green, brown, dusky, blue, black, copper, olive, red and so on. And the deeper they live (to 300 fathoms), the brighter their coloration. Other rockfish names reflect physical characteristics: quillback, pygmy, shortbelly, longspine, yelloweye. The most important commercial species are the Pacific ocean perch and the widow, canary, chilipepper, yelloweye, vermillion and thornyhead rockfish. The fish can range in size from 1 to 40 pounds, but 2 to 5 pounds is most common. Rockfish are caught by trolling, trawling, longlining, jigging, trapping and gillnetting — either targeted or as bycatch. Rockfish are extremely slow growing, making them susceptible to overfishing.

PRODUCT PROFILE

Rockfish has a delicate, nutty, sweet flavor. The meat is lean and medium-firm in texture, with a fine flake. Deep-skinned rockfish with the fat line removed have the most delicate flavor. The skin should be shiny and bright. If it is a yellow-orange color or is wrinkled and looks too large for the fish, the fish is stale. Fillets shouldn't have signs of browning, graying or yellowing.

Rockfish generally fall into two categories: red-fleshed and brown-fleshed. Red-fleshed fillets are generally considered more desirable, because they are less oily and have a longer shelf life.

FLAVOR



TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	94
Fat Calories	14
Total Fat	1.6 g
Saturated Fat	0.4 g
Cholesterol	35 mg
Sodium	60 mg
Protein	18.8 g
Omega-3	0.4 g

Source: USDA
Photo courtesy of California Seafood Council

COOKING TIPS

Rockfish holds up well to baking and remains moist when cooked. The firm texture also makes rockfish suitable for soups, chowders and stews. In Asian cuisine, rockfish are often served whole, either steamed or deep fried, with a variety of sauces to accent the mild flavor. Fillets hold together better with skin on. While they might not be sturdy enough to grill, whole, dressed fish barbecue well.

Substitutions Cod, Grouper, Atlantic ocean perch

GLOBAL SUPPLY

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

- Fresh
- Whole
- H&G
- Fillets

Frozen

- Whole
- H&G
- Fillets
- Blocks

Value-added

- Breaded/battered portions

Sablefish

French	*Morue charbonnière*
German	*Kohlenfisch*
Italian	*Merluzzo dell'Alaska*
Japanese	*Gindara*
Spanish	*Bacalao negro*

YOU SHOULD KNOW...

Sablefish prices typically drop with latitude. The highest-priced product comes from Alaska. The least expensive product comes from California, near the southern end of the species' range, where the fish are smaller.

Scientific name: *Anoplopoma fimbria*
Market name: Sablefish
Common names: Sable, black cod, Alaska cod, butterfish, coalfish, skilfish

Sablefish, thus known because of its black, almost furry skin, is also commonly called black cod, though it is not in the cod family. It is also called butterfish in reference to its melt-in-your-mouth, oil-rich meat. The oil makes sablefish an excellent species for smoking, a treatment relished by the early Makah Indians on the Northwest coast, who smoked the fish over green wood. Sablefish is caught in deep water along the Pacific Coast from Alaska to southern California by trawls, longlines and traps. It is most abundant off northern British Columbia and in the Gulf of Alaska. Some say longlines and traps produce the best-quality sablefish. As a general rule, the larger the sablefish, the better the quality. Though most sablefish has traditionally gone to Japan, where demand and prices are high, an increasing amount is finding its way into the domestic market as U.S. consumers learn to enjoy the unique, buttery flavor.

FLAVOR

TEXTURE

PRODUCT PROFILE

Sablefish meat has a high fat content, which gives it a rich though fairly mild flavor. It has a distinctive taste all its own. Its high oil content also gives sablefish a soft, velvety texture.

The flesh has large, white flakes and is an excellent source of omega-3 fatty acids. Because of its high oil content, sablefish has a short shelf life and must be handled with care.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	195
Fat Calories	137.7
Total Fat	15.3 g
Saturated Fat	3.2 g
Cholesterol	49 mg
Sodium	56 mg
Protein	13.4 g
Omega-3	1.6 g

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh
- H&G
- Fillets (pinbone-in)
- Steaks

Frozen
- H&G

Value-added
- Smoked

COOKING TIPS

Because it is so rich, sablefish can benefit from salty or acidic flavorings to cut the natural oils. Ginger and soy sauce are good complements. A popular preparation of sablefish in Japan is Sake Kasu, in which sablefish is marinated in a sake-based paste and then grilled. The meat is excellent for barbecuing, as it browns nicely and stays moist and tender. It's also a good candidate for smoking.

Substitutions Chilean sea bass, Escolar, Salmon

GLOBAL SUPPLY

Salmon, Atlantic

French	*Saumon de l'Atlantique*
German	*Echter Lachs*
Italian	*Salmone*
Japanese	*Sake masu-rui*
Spanish	*Salmón*

YOU SHOULD KNOW...

Since farmed Atlantic salmon are fed processed, heat-treated, pelletized food, they are free of the anisakis roundworms to which wild salmon are subject.

Scientific name: *Salmo salar*
Market name: Atlantic salmon
Common names: Atlantic salmon, farmed salmon, Eastern salmon

One of the great success stories of modern aquaculture, Atlantic salmon farming first emerged on a commercial scale in the early 1980s, with Norway leading the way. Since that time, global production has increased tremendously, and Atlantic salmon are farmed in more than a dozen countries around the world — most notably, Latin America, Europe and North America. Atlantic salmon lack the many common and regional names of the wild Pacific salmons, but countries that farm the fish tack on their national label: Scottish salmon, Norwegian salmon, etc. The fish are typically raised in large, floating net-pens, often in open bays, to help give them a "natural" flavor. The adult Atlantic salmon is a handsome, silver-skinned fish with distinct black cross-like spots over the body and head and above the lateral line. It closely resembles the Pacific coho. Farmed Atlantics start at 4 pounds, but fish up to 18 pounds are available.

FLAVOR

TEXTURE

PRODUCT PROFILE

The flavor of Atlantic salmon is milder than that of the wild salmon species. The meat is moderately firm and oily, though not as fatty as that of the wild chinook, or king, salmon.

The flesh color varies, depending on the amount of pigment in the feed, but generally Atlantics' meat is a rich orange or pinkish-orange color. The fatty meat appears almost marbled when raw. Atlantic salmon retains its color when cooked and has a large, moist flake.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	183
Fat Calories	98.1
Total Fat	10.9 g
Saturated Fat	2.2 g
Cholesterol	59 mg
Sodium	59 mg
Protein	19.9 g
Omega-3	1.9 g

Source: USDA
Photo courtesy of Norwegian Seafood Export Council

COOKING TIPS

Fillets of Atlantic salmon are pleasing to the eye and should be used with recipes that show off the fish. With the Atlantic salmon's delicate flavor, avoid accompanying flavors that overpower the fish. A light dill-and-yogurt or cucumber-dill sauce works well, and sliced cucumbers and new potatoes are ideal companions.

Substitutions Other salmon, Rainbow trout

GLOBAL SUPPLY

Australia
Canada
Chile
England
Faroe Islands
Norway
Scotland
Iceland
Ireland
United States

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [x] Poach
- [ ] Sauté
- [x] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh
- Dressed
- H&G
- Fillets (skin-on/skinless, pinbones in or out)
- Roasts

Frozen
- Dressed
- H&G
- Fillets (skin-on/skinless, pinbones in or out)
- Roasts

Value-added
- Smoked

Salmon, chinook

French	*Saumon royal*
German	*Königslachs*
Italian	*Salmone reale*
Japanese	*Masunosuke*
Spanish	*Salmón chinook*

YOU SHOULD KNOW...

Chinook is the most expensive of all salmon species and is most often found in upscale restaurants and better supermarkets. The highest-quality kings are troll-caught in the ocean.

Scientific name: *Oncorhynchus tshawytscha*
Market names: Chinook, king or spring salmon
Common names: Chinook, tyee, blackmouth

Chinooks are the largest and top-of-the-line among the Pacific salmon species. Unlike other Pacific salmon, which spend anywhere from one to three years at sea, kings can stay out as long as five years before returning to their natal streams. They are harvested from central California to the Yukon River in Alaska and in Canada, primarily by trollers but also by seiners and gillnetters. Some chinooks are well over 50 pounds but the bulk of the commercial catch is between 11 and 18 pounds. Chinook salmon are often known and marketed by the name of the river system from which they come. The Copper River produces excellent kings. Other Alaska river systems are the Kuskokwim and the Yukon. The return of Copper River salmon in late May or early June heralds the beginning of Alaska's wild salmon season. Chinook salmon is also farmed in British Columbia, Washington, New Zealand and Chile.

FLAVOR

TEXTURE

PRODUCT PROFILE

Chinooks need a large fat reserve for their long-distance migration. That translates into a pronounced, buttery, rich taste. The oily chinook flesh is softer than that of other wild salmon species. Except for some white-meat strains of chinook, the flesh is almost always red, never pink.

White king is a strain with pale meat, not to be confused with "pale kings," which are sexually mature fish. Though light in color, the white king's flavor is as rich as the more deeply colored chinook's.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	179
Fat Calories	94
Total Fat	10.4 g
Saturated Fat	3.1 g
Cholesterol	50 mg
Sodium	47 mg
Protein	19.9 g
Omega-3	2.3 g

Source: USDA
Photo courtesy of Marriott International

COOKING TIPS

Simple treatments are perfect for the rich and flavorful king salmon, but the fish can also stand up to hearty flavorings. For a simple preparation that packs a flavor wallop, try broiling or grilling a piece of king salmon with pesto sauce. Start cooking with the top side left plain. After turning, give the cooked top surface a generous application of basil pesto.

Substitutions Other salmon, Rainbow trout

GLOBAL SUPPLY

Canada
Chile
New Zealand
Russia
United States

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- □ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- Dressed (head on)
- H&G
- Steaks
- Fillets (bone-in/boneless)

Frozen
- Whole
- Dressed (head on)
- H&G
- Steaks
- Fillets (bone-in/boneless)

Value-added
- Smoked
- Canned

Salmon, chum

French	*Saumon keta*
German	*Keta-Lachs*
Italian	*Salmone keta*
Japanese	*Sake*
Spanish	*Salmón chum*

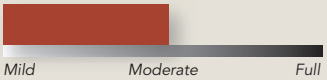
YOU SHOULD KNOW...

With the lowest oil content of the five Pacific salmon species, chums are often the least expensive and least flavorful, but they do offer a longer shelf life.

Scientific name: *Oncorhynchus keta*
Market names: Chum or keta salmon
Common names: Dog salmon, calico salmon, chub

One of the most wide-ranging of the five Pacific salmon species, chums are landed in commercial quantities in the eastern North Pacific from Del Mar, California, to the Arctic Ocean's Mackenzie River and south to Honshu, Japan. Commercially caught chums run from 6 to 12 pounds. Almost all chums are caught with seines or gillnets. Although the price is right, many buyers still shun chums because of the fish's inconsistent quality. At the top of the line are the small quantities of troll-caught chums produced by fishermen in British Columbia and Southeast Alaska. Seine-caught fish are also quite good. Chum is graded in several stages. Silverbrights are ocean-run fish with reddish-pink flesh and shiny silver skin. Semibrights have watermarks above the lateral line. Grading terms such as fall chum, dark chum, qualla, calico chum and river chum are used for fish with watermarks below the lateral line.

FLAVOR



TEXTURE

PRODUCT PROFILE

Chum salmon has a lower oil content than the other wild salmon, which gives it a relatively mild flavor. However, it's the meatiest and firmest in texture of the wild species. The pinkish-orange flesh of chum salmon is paler in color than that of sockeye, coho or chinook and is firm and coarse.

Raw meat is orange, pink or red. The exact color depends on where the fish was caught. Meat becomes progressively paler and grayish during the upstream migration to spawn. Fish with watermarks below the lateral line have soft meat that is not flavorful, though it may be pink.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	120
Fat Calories	34
Total Fat	3.8 g
Saturated Fat	0.8 g
Cholesterol	74 mg
Sodium	50 mg
Protein	20.1 g
Omega-3	0.7 g

Source: USDA
Photo courtesy of Marriott International

COOKING TIPS

Chum meat is good in casseroles and other dishes where color is not a consideration. Because of its relatively low price, chum is often used in value-added items. Since chum is a lean fish, it doesn't grill or broil as well as the fattier salmon. It's better to use chum with recipes designed to help the fish retain its moisture. For grilling, marinate first and baste while cooking.

Substitutions Other salmon, Rainbow trout

GLOBAL SUPPLY

Japan
Russia
United States

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

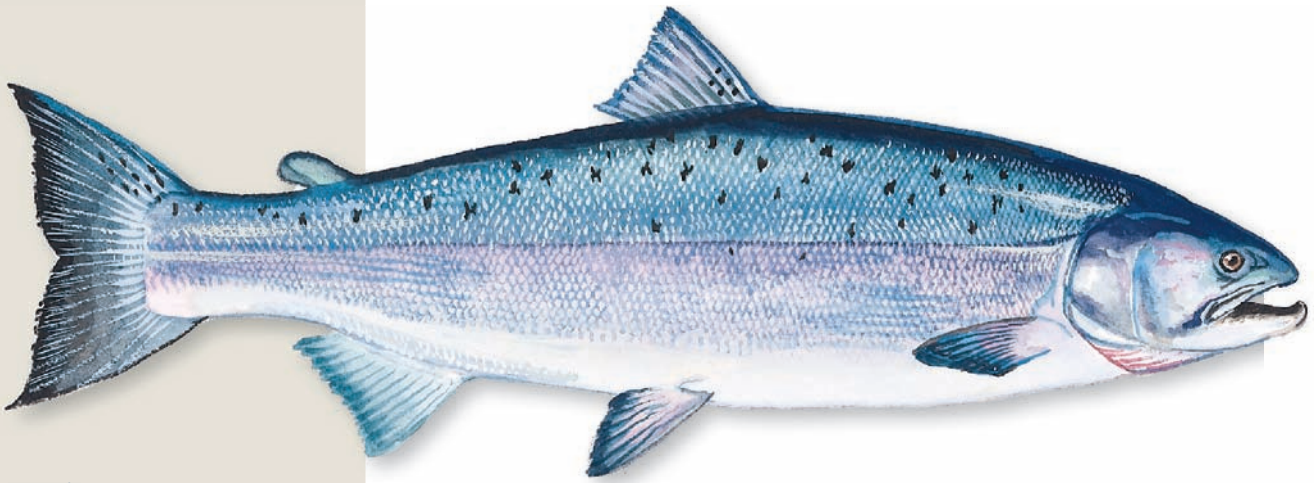
Fresh
- H&G
- Steaks
- Fillets (bone-in/boneless)

Frozen
- Dressed
- H&G
- Steaks
- Fillets (bone-in/boneless)
- Sides (upon request)

Value-added
- Canned
- Blocks
- Smoked

Prepared entrées
- Patties, burgers, etc.

Salmon, coho



French	*Saumon argenté*
German	*Silberlachs*
Italian	*Salmone argentato*
Japanese	*Ginzake*
Spanish	*Salmón coho*

YOU SHOULD KNOW...

Like all wild salmon, the coho's skin color changes as it gets nearer to fresh water. However, coho flesh color remains more consistent than that of watermarked chum.

Scientific name: *Oncorhynchus kisutch*
Market names: Coho or silver salmon
Common names: Coho or silver salmon

Of all the Pacific salmon, the coho looks most like the Atlantic salmon. A sure way to tell the difference is by counting the anal fin's rays (the hard, bone-like parts). Pacific salmon have 13 to 19 rays; Atlantics have 10 or fewer. Coho is also known as silver salmon, medium-red salmon (a canners' term), Hoopid salmon, white salmon, blush salmon, silversides and jack salmon, though "jack" applies to all immature male salmon. Coho salmon are found on both sides of the Pacific, from southern California to Alaska, and from Russia to Japan. Alaska dominates global harvests of wild coho salmon, which are the backbone of Alaska's salmon troll fishery, though some fish are taken by gillnets and seines. Cohos are also farmed in floating pens in Chile and Japan. Smaller than chinooks and larger than chum or sockeyes, market-size cohos average 4 to 12 pounds. Hatchery-raised fish are often smaller, running 2 to 3 pounds apiece.

PRODUCT PROFILE

The coho's size, relatively high fat content and excellent color retention make it a desirable fish. Pan-sized coho have a delicate flavor. Fillets from larger fish have an excellent, mild salmon taste but are more flavorful than chum. The flesh of wild coho appears soft but becomes firm when cooked.

Reddish-orange coho meat is moderately fatty and flakes well. The flesh is usually pinker than that of chum but paler than chinook or sockeye. Since most coho are troll caught, avoid fish with signs of bruising.

FLAVOR

TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	146
Fat Calories	53
Total Fat	5.9 g
Saturated Fat	1.3 g
Cholesterol	45 mg
Sodium	46 mg
Protein	21.6 g
Omega-3	1.3 g

Source: USDA
Photo courtesy of Marriott International

COOKING TIPS

Coho's oil content makes it ideal for grilling. Baste with marinade, cover and cook until salmon is opaque through and flakes readily. Cohos are also good smoked and are favored by European smokers.

Substitutions Other salmon, Rainbow trout

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- □ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh

- Dressed (head on)
- H&G
- Steaks
- Fillets (typically pinbone-in)
- Tail roasts

Frozen

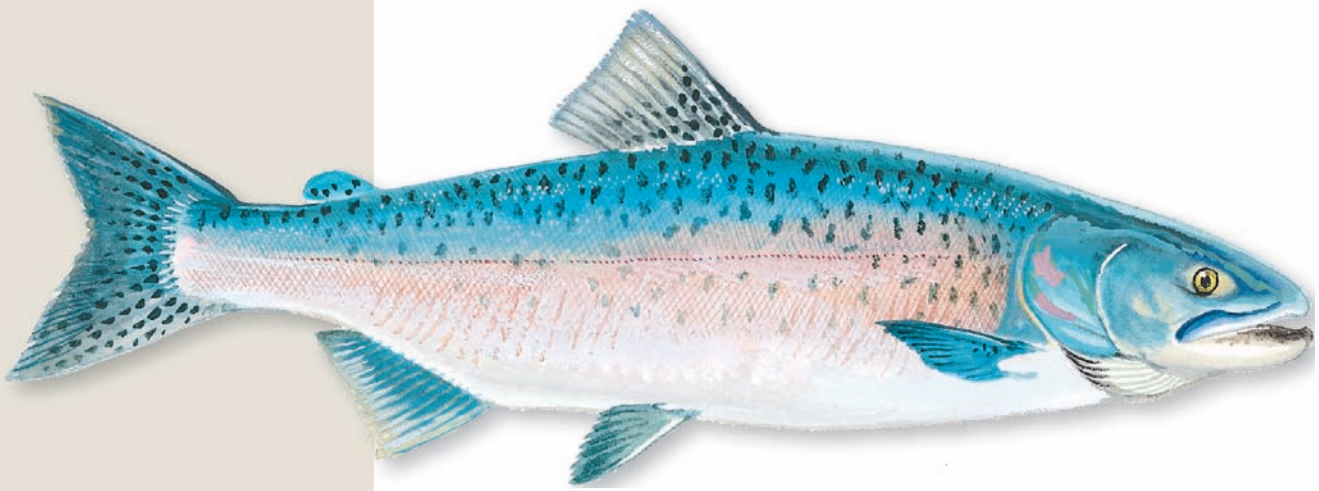
- H&G
- Steaks
- Fillets (typically pinbone-in)
- Tail roasts

Value-added

- Smoked
- Portions

GLOBAL SUPPLY

Salmon, pink



French	*Saumon rose*
German	*Buckellachs*
Italian	*Salmone rosa*
Japanese	*Sepparimasu*
Spanish	*Salmon rosado*

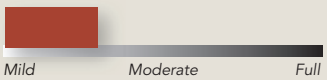
YOU SHOULD KNOW...

The best-quality pink salmon is troll-caught. The fish is bled and iced almost immediately.

Scientific name: *Oncorhynchus gorbuscha*
Market names: Pink or humpback salmon
Common names: Pink salmon, humpy

The "can-friendly" pink is the smallest and most plentiful of the wild salmon, accounting for the lion's share of the canned pack. That pink salmon mostly winds up in cans is due partly to its habit of showing up in huge schools during short periods of time and requiring rapid, high-volume processing. However, pinks are increasingly entering the fresh and frozen markets. And some canners have taken a step forward with boneless, skinless pink fillets packed in a retort pouch. The male pink's pronounced hump at breeding time has given the fish its colloquial name, "humpback." Pink salmon can weigh up to 12 pounds, but the range of those caught commercially is 2 to 6 pounds. Pinks are found on both sides of the North Pacific, from Puget Sound to Alaska and from Russia to North Korea, including the Bering Sea. They are taken by gillnets and seines and by trolling. They are not farmed.

FLAVOR



TEXTURE

PRODUCT PROFILE

A generally lean and mild-flavored fish, pink salmon has meat that is low in oil and small-flaked. As the name implies, this salmon's flesh is truly pink. The color is paler than the meat of the other salmon species and lacks the orange tint. It also has softer meat than most salmon.

Pink salmon eggs are the second most valuable (behind those of chums) for salmon caviar.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	116
Fat Calories	32
Total Fat	3.5 g
Saturated Fat	0.6 g
Cholesterol	52 mg
Sodium	67 mg
Protein	19.9 g
Omega-3	1.1 g

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [ ] Grill
- [x] Poach
- [ ] Sauté
- [ ] Smoke
- [ ] Steam

COOKING TIPS

With their low fat content, pinks don't grill as well as other salmon. Whatever cooking method you choose, it's important not to let the lean meat dry out. Cook with moist heat or baste frequently while cooking. Pinks also work well in chowders, sandwiches, pasta preparations, casseroles and salads.

Substitutions Chum salmon, Rainbow trout

PRIMARY PRODUCT FORMS

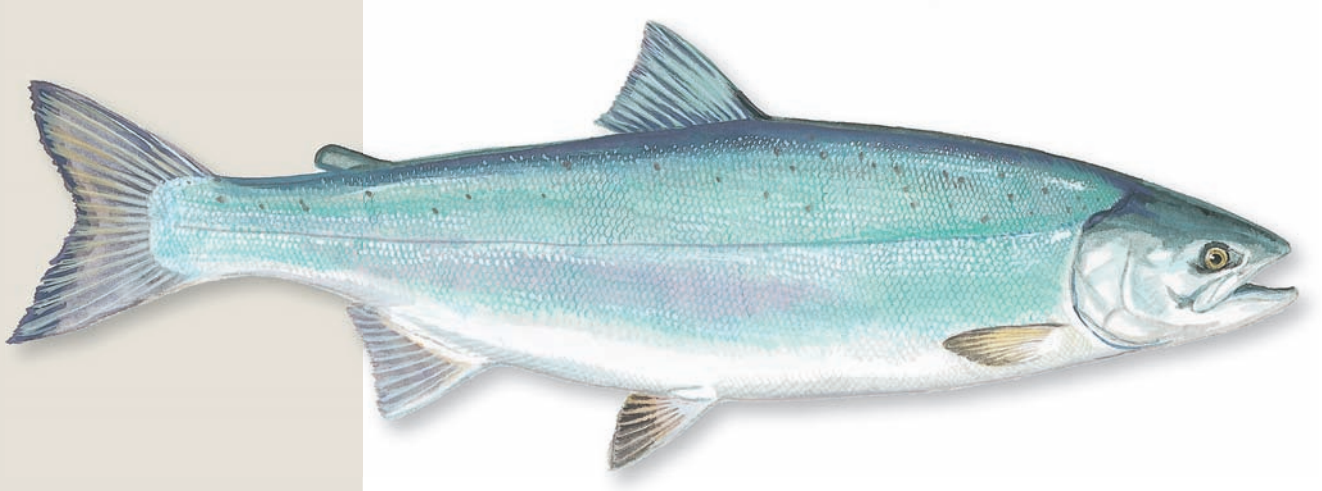
Fresh
- Dressed

Frozen
- H&G
- Blocks

Value-added
- Canned (most common form)
- Caviar
- Smoked
- Roasts

GLOBAL SUPPLY

Salmon, sockeye



French	*Saumon rouge*
German	*Rotlachs*
Italian	*Salmone rosso*
Japanese	*Sake masu-rui*
Spanish	*Salmón sockeye*

YOU SHOULD KNOW...

Anisakis, a small roundworm, can be present in wild salmon. Freezing the fish to minus 20°F or cooking to an internal temperature of 145°F kills parasites.

Scientific name: *Oncorhynchus nerka*
Market names: Salmon, red salmon, sockeye, blueback
Common name: Sockeye salmon

Sockeye salmon is the most valuable U.S. salmon species and the premium canned salmon, known as red salmon to canners. Sockeye are also known as kokanees (a landlocked species) and quinaults. The name sockeye has nothing to do with the fish's eyes but is a corruption of the Native American name *sukkai*. Sockeye range from California's Sacramento River system north to the Bering Sea and then south to northern Hokkaido. Bristol Bay, Alaska, has the largest sockeye run, during which millions of fish are taken. Wild-run Bristol Bay sockeye are of such quality that they often compete with Chilean farm-raised coho on the world market. There are also major runs in the Copper River and parts of Southeast Alaska. Commercially caught fish run 4 to 10 pounds. Most are caught with gillnets. You'll pay a premium for seine-caught fish, but they're very good, as are the small portion of troll-caught sockeye salmon. Sockeye are not farmed.

FLAVOR

TEXTURE

PRODUCT PROFILE

For its long migration, the sockeye carries a large amount of fat, making it rich in omega-3s. This gives the meat a nice, rich flavor. Some people feel the flavor rivals or is even better than that of chinook.

The raw meat is firm and has a bright-red or orange-red color. Sockeyes are the reddest-fleshed of the wild salmon. Cooked meat remains red and firm. Skin and flesh color make sockeye attractive as a display item and in buffets.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	168
Fat Calories	77
Total Fat	8.6 g
Saturated Fat	1.5 g
Cholesterol	62 mg
Sodium	47 mg
Protein	21.3 g
Omega-3	1.2 g

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING TIPS

A light marinade and simple grilling treatment showcase the wonderful flavor of sockeye. Use salmon steaks 1 to 2 inches thick. Prepare a marinade by mixing 1 cup white wine with 1/4 teaspoon dried marjoram, 1 teaspoon minced onion and freshly ground black pepper. Marinate in the refrigerator for a couple of hours, turning the salmon once or twice. Grill until fish flakes readily and is no longer translucent.

Substitutions Chinook salmon, Coho salmon, Rainbow trout

GLOBAL SUPPLY

Canada
Japan
Russia
United States

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- □ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh
- Dressed
- Steaks
- Fillets (bone-in/boneless)

Frozen
- H&G
- Steaks
- Fillets

Value-added
- Canned (primary form)
- Smoked (hot-smoked)
- Burgers, patties

Shad, American

French	*Aloes savoureuse*
German	*Amerikanischer Maifisch*
Italian	*Alaccia americana*
Spanish	*Sábalo americano*

YOU SHOULD KNOW...

American shad is strictly a seasonal fish (late March through early June) and is best before spawning, when heavy feeding makes the meat rich and flavorful.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Alosa sapidissima*
Market name: American shad
Common names: Atlantic shad, Potomac shad, northern silver shad

American shad, the largest member of the herring family, is widely considered the tastiest of the world's 31 shad species; the species name (*sapidissima*) means "most delicious." Shad is a seasonal novelty on restaurant menus, and shad bakes are a rite of spring in many Mid-Atlantic communities. John McPhee's 2002 book *The Founding Fish*, which recounts a wealth of shad lore and eulogizes the fish's role in America's history, fueled a surge in the fish's popularity with anglers and diners. Shad roe, the ripe eggs of the female fish, has been lauded as the "foie gras" of seafood.

The species is anadromous, living at sea and migrating up rivers only to spawn. During spawning runs, fish are commercially caught with gillnets. Market size is typically is 3 to 5 pounds. Key fisheries are on the eastern U.S. coast, from Florida to Maine, with the biggest spawning runs in the Hudson River. Although shad is abundant along the Pacific Coast, there are no major commercial fisheries there due to concerns for native salmon. Dams, pollution, overfishing and predation have decimated the East Coast commercial shad fishery. Restoration efforts, including the phase-out of coastal intercept fishing, are ongoing.

PRODUCT PROFILE

The raw flesh of American shad appears grayish. Cooked, it varies in color from pinkish beige to deep brown, with the darker flesh the most richly flavored. The large roe sacs are bright orange.

Shad meat is sweet, rich and tender, with high oil content. Fans refer to the flavor as "poor man's salmon."

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	197
Fat Calories	125
Total Fat	13.8 g
Saturated Fat	3.1 g
Cholesterol	75 mg
Sodium	51 mg
Protein	16.9 g
Omega-3	2.5 g

Source: USDA
Photo © Karl Petzke

COOKING TIPS

The bony shad was described by one Native American tribe as "a porcupine turned inside out," which can make whole shad a challenge to eat. However, slow cooking (steaming or baking at low temperatures) dissolves the small bones. Fillets, broiled or baked, are a more popular choice. For an update on traditional "planked shad," boned fillets are nailed to an oak or hickory board, along with bacon slices, and slow cooked before a charcoal fire. Shad roe can be sautéed in butter or braised in white wine.

Substitutions: Mackerel, Salmon, Bluefish

GLOBAL SUPPLY

COOKING METHODS

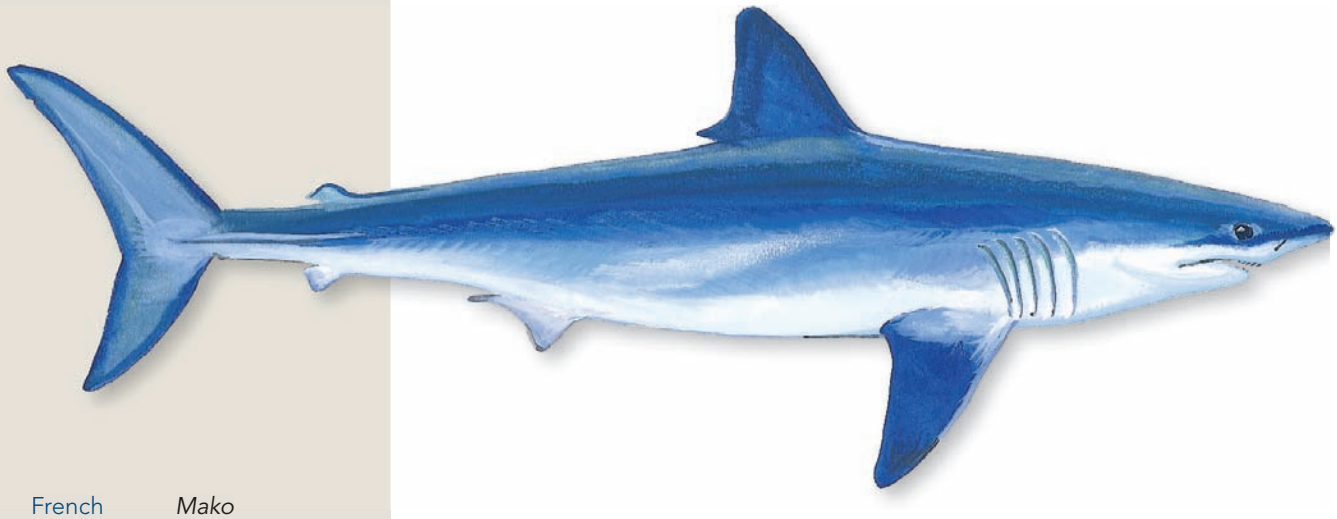
- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [x] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole
- Fillets
- Roe

Shark, mako



French	*Mako*
German	*Mako*
Italian	*Squalo mako*
Japanese	*Aozame*
Spanish	*Marrajo*

YOU SHOULD KNOW...

Because shark is a predatory fish in which methylmercury concentrates, the FDA advises pregnant and nursing women, women of childbearing age and young children to avoid eating shark meat.

Scientific name: *Isurus oxyrinchus*
Market name: Mako shark
Common names: Shortfin mako, blue pointer, bonito shark, Atlantic mako, Pacific mako

Feeding on some of the world's fastest tunas and billfish, the mako shark is at the very apex of the marine food chain. It's also among the best-tasting of the hundreds of shark species around the world. There are two mako species: *Isurus oxyrinchus*, or shortfin mako, and *I. paucus*, or longfin mako. *Oxyrinchus* is the more common of the two and is the commercially significant species. Mako shark is an excellent alternative to swordfish and sometimes mislabeled as such. To distinguish mako from swordfish, check the skin; mako feels like sandpaper, while swordfish is smooth. Makos are harvested from subtropical or temperate waters worldwide. U.S. fisheries exist off southern California, in the Gulf of Mexico off Florida and following the Gulf Stream north to New England. Makos are usually taken as a bycatch of longliners. The shark's maximum weight is 1,500 pounds, but 125 pounds is the average market size.

PRODUCT PROFILE

Mako shark is moist and slightly sweet, with a full-bodied, meaty taste. Both flavor and texture are similar to swordfish, but the flesh of the mako is moister, and the meat is not as sweet. Fresh, raw mako is very soft and ivory-pink or a muddy, reddish color that turns ivory white and firm when cooked.

While the lean, dense meat looks very similar to swordfish, it lacks the whorls of the swordfish steak.

Like all sharks, makos carry urea in their bloodstreams. They must be bled immediately and iced to prevent the urea in the tissues from turning to ammonia. If you smell ammonia, don't accept the fish.

FLAVOR

TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed shark species)

AMOUNT PER SERVING	
Calories	130
Fat Calories	40.5
Total Fat	4.5 g
Saturated Fat	0.9 g
Cholesterol	51 mg
Sodium	79 mg
Protein	20.9 g
Omega-3	0.9 g

Source: USDA

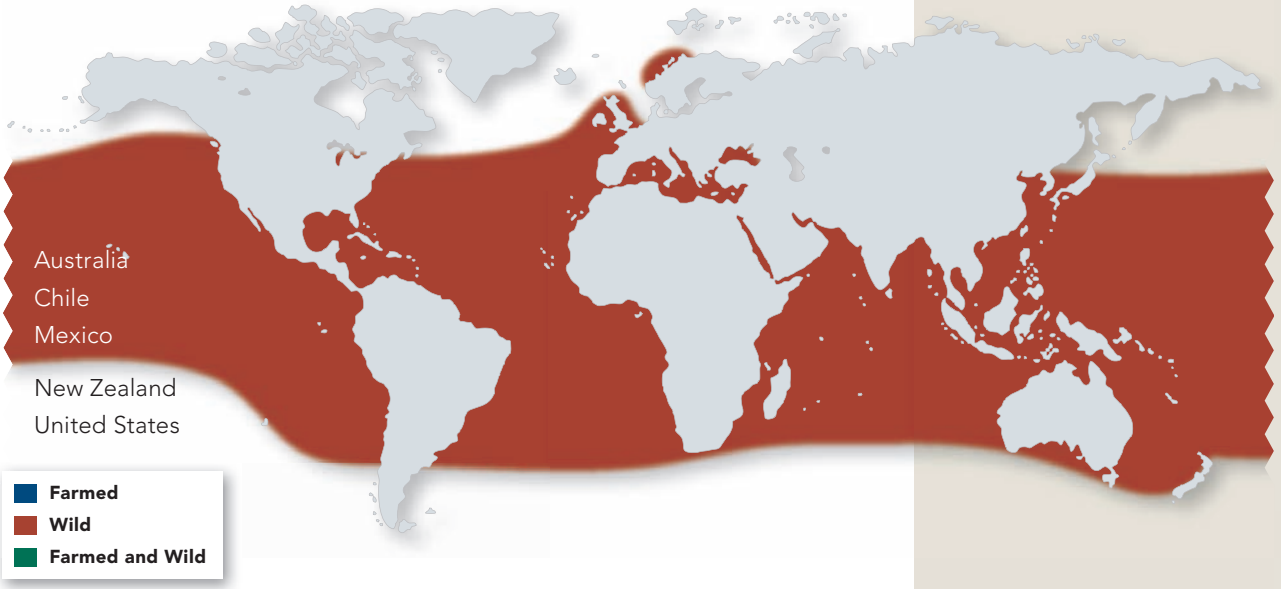
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Mako can be marinated, blackened, cubed for use in soups and stews, or chunked for kebabs. Wrapping or covering the meat during cooking keeps the moisture in. Trim red meat away before cooking, since bloodlines can impart a bitter taste.

Substitutions Swordfish, Tuna, Other sharks

GLOBAL SUPPLY



COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

- H&G (belly flap removed)
- Wheels
- Slabs or chunks
- Fillets (whole side, skinless)
- Loins
- Steaks

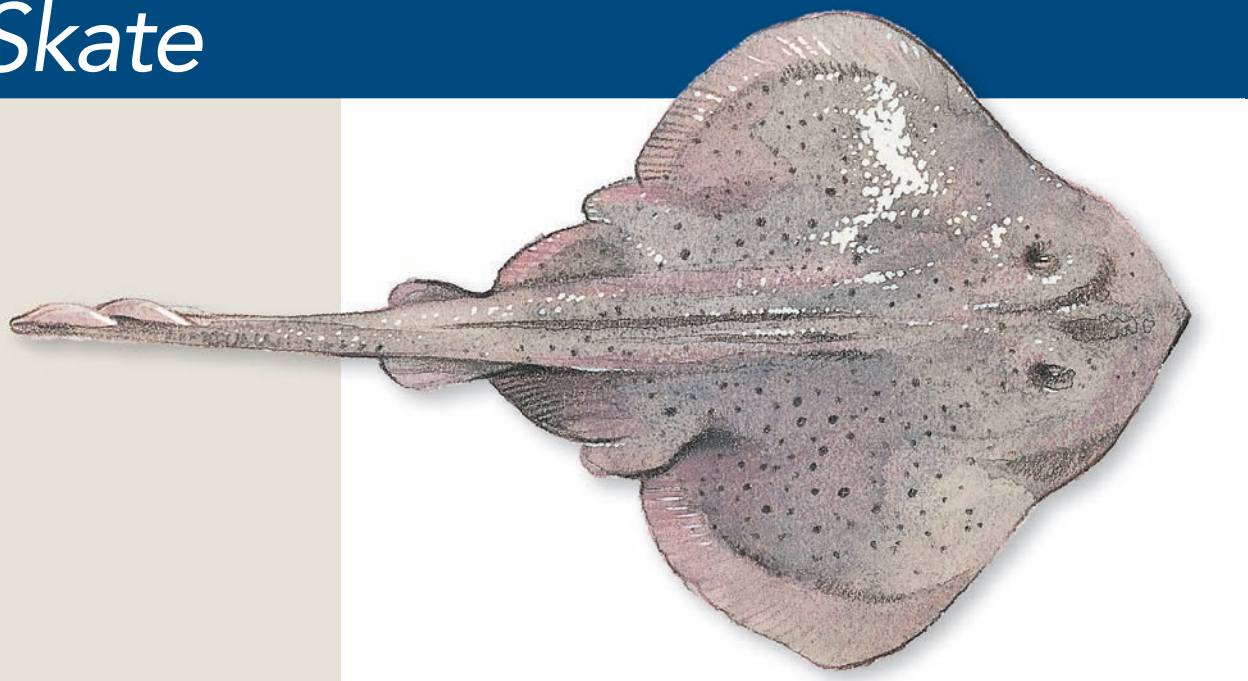
Frozen

- H&G (belly flap removed)
- Wheels
- Slabs or chunks
- Fillets (whole side, skinless)
- Loins
- Steaks

Value-added

- Smoked

Skate



French	*Raie*
German	*Rochen*
Italian	*Razza*
Japanese	*Gangiei*
Spanish	*Raya*

Scientific name: *Raja* spp.
Market name: Skate
Common names: Big skate, clearnose skate, little skate, rosetta skate, California skate, barndoor skate, winter skate, spreadfin skate, thorny skate, longnose skate, smooth skate, spinytail skate

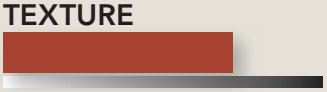
YOU SHOULD KNOW...

Properly handled skate should have a fresh odor. If the skate isn't bled, gutted and chilled immediately, the uric acid breaks down into ammonia. If you detect an ammonia smell, reject the fish.

The bottom-dwelling, kite-shaped skate is found worldwide in temperate and cold waters as well as in deep, tropical waters. Skates are taken with longlines and gillnets, both as a targeted fishery and as bycatch. Fresh skate landed in winter is considered the best. Only the wings of the skate are eaten. It was long believed that skate wings were cut up and sold as scallops. However, experts note that the skate's cartilage would make the process economically infeasible. Like sharks, skates have no bones, but rather a skeleton of cartilage. Most skates are brown or grayish. Skates are commercially harvested on both coasts of North America. East Coast skates include the clearnose (*R. eglanteria*), barndoor (*R. laevis*), little skate (*R. erinacea*), winter skate (*R. ocellata*) and the thorny skate (*R. radiata*). Pacific Coast skates include the big skate (*R. binoculata*), California skate (*R. inornata*) and the longnose skate (*R. rhina*), among others.

FLAVOR

TEXTURE



PRODUCT PROFILE

Skate has a mildly pronounced flavor similar to scallops. The flesh is soft but firms up after it has been chilled. Raw meat has a slightly off-white, sometimes pinkish, color and cooks up off-white.

The meat of the wings, the only edible parts, has a striated, open-fan configuration. Because of the wing structure, skate has a stringy texture. Each wing produces two fillets — one from the upper side and one from the lower.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	95
Fat Calories	9
Total Fat	1 g
Saturated Fat	N/A
Cholesterol	N/A
Sodium	90 mg
Protein	21 g
Omega-3	N/A

Source: "Simply Seafood"
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole
- Wings (skin-on)
- Fillets (skin-off)

Frozen

- Wings (skin-on)
- Fillets (skin-off)

COOKING TIPS

The wings are composed of strands of flesh, a layer of cartilage and then more strands of flesh. The meat can be removed from the cartilage after it's cooked, though cooking does soften the cartilage. Skin should be removed before cooking. Try poaching skate in liquid made of water, wine vinegar, a thinly sliced small onion, a bay leaf, parsley and thyme. Serve with browned butter to which capers have been added.

Substitutions Scallops, Flounder, Rockfish

GLOBAL SUPPLY

Smelt

French	*Éperlan de lac*
German	*Stint*
Italian	*Sperlano*
Japanese	*Kyûrino*
Spanish	*Eperlano*

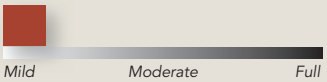
Scientific name: *Osmerus mordax*
Market names: Smelt, American smelt
Common names: Rainbow smelt, spirling, saltwater smelt, freshwater smelt, icefish

YOU SHOULD KNOW...

Try to buy just-caught smelts; the flavor difference is worth the effort. Otherwise, remember that these fish are delicate, so look for shiny skin without bruising or dents. The fresh-cucumber scent is another indicator of freshness.

Of the nine smelt species that inhabit North American waters, the most common is the ubiquitous rainbow smelt, found in the western Atlantic and Pacific oceans and in the Arctic Sea. It is mainly an inshore, anadromous fish that spends most of its life in saltwater but migrates to freshwater lakes and streams in the spring to spawn. However, smelt is a highly adaptable species, and landlocked populations have established themselves from Maine to the Great Lakes and southeastern Canada. Primary commercial fisheries for smelts are in the Great Lakes, off the coast of Canada around New Brunswick and on the Maine coast. Though catches are greatest in the spring, smelts are also targeted by ice fishermen. The silvery little fish reportedly take their name from the Anglo-Saxon word "smoelt," meaning shiny. They are relished for their wonderful, fresh odor, reminiscent of freshly mowed grass or sliced cucumber, which has earned them the nickname "cucumberfish."

FLAVOR



TEXTURE

PRODUCT PROFILE

Market-sized rainbow smelts are generally around 6 inches long, with olive-green skin that has a silvery sheen. Smelts have soft bones; small, cooked, H&G smelts can be eaten bones and all. With larger smelts, the cooked meat flakes readily off the bones. The delicate skin is also eaten.

Smelts have lean, white flesh that becomes white, soft and fine-flaked when cooked. It has a fresh, sweet flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	97
Fat Calories	21.6
Total Fat	2.4 g
Saturated Fat	0.5 g
Cholesterol	70 mg
Sodium	60 mg
Protein	17.6 g
Omega-3	0.7 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- ☐ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh

Whole

H&G

Frozen

H&G

Value-added

Canned

COOKING TIPS

Larger smelts can be butterflied or filleted for broiling or grilling or left whole and baked. But 6-inch smelts are most common and are cooked and eaten whole (with or without head and viscera). Traditional preparations call for dipping smelts in batter and deep-frying or dredging them in flour or bread crumbs and then pan-frying.

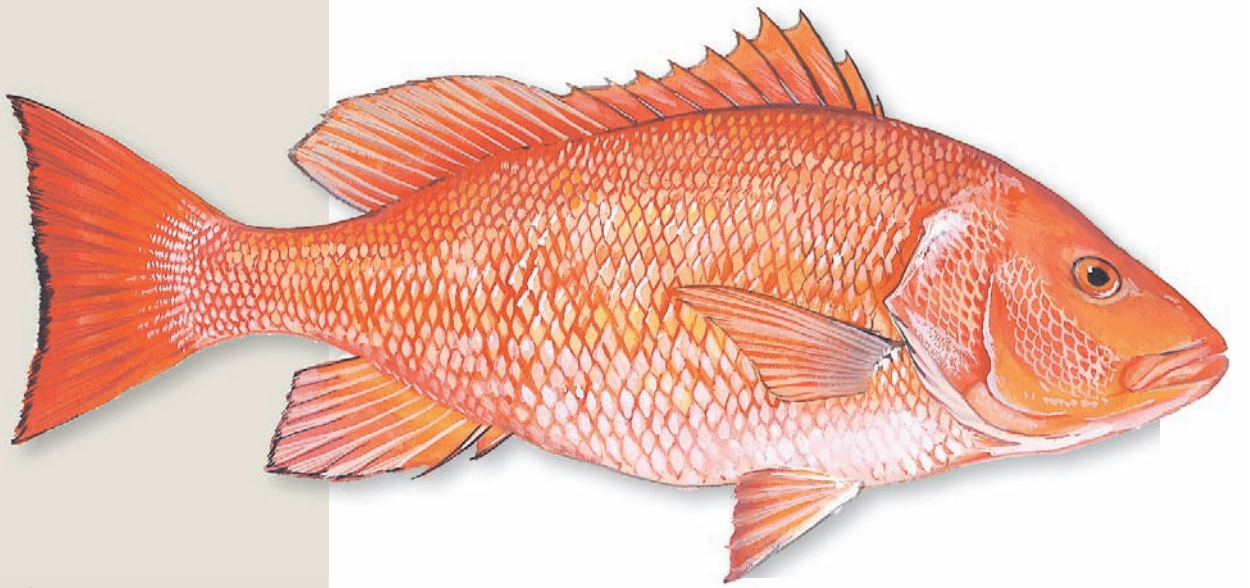
Substitutions Herring, Lake whitefish

GLOBAL SUPPLY

Canada

United States

Snapper



French	*Vivaneau*
German	*Schnapper*
Italian	*Lutiano rosso*
Japanese	*Tarumi feudai*
Spanish	*Pargo de golfoo*

YOU SHOULD KNOW...

Since snappers are reef fish, the possibility of ciguatera poisoning exists. Ciguatera is an area-specific, not a species-specific, problem and can be avoided by not purchasing fish from known "hot spots."

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Lutjanus campechanus*
Market name: Snapper
Common names: American red snapper, Red snapper, Caribbean red snapper, Mexican snapper

The name red snapper has been foisted off on just about any fish that is red. However, the FDA insists that only American red snapper, *L. campechanus,* can be legally shipped interstate bearing the authentic red snapper label. Beware of "snapper" sold on the West Coast; it could actually be rockfish, which has a completely different taste and texture. Red snappers grow to 35 pounds, although 4- to 6-pound fish are most common. Fish weighing 2 to 4 pounds have a metallic, pink skin. As they grow larger, their skin becomes redder. Many of the other snapper species are good eating, but they don't have the trademark red skin and red eyes of the American red snapper. It also sports large, dog-like teeth, which are what give this fish its snapper name. The species is found from North Carolina to Florida's "snapper banks," off the coasts of Texas and Louisiana and down to the Campeche Bank off Mexico. Imports come from Mexico. Snapper is taken with longlines and sometimes by traps and trawls.

PRODUCT PROFILE

Red snapper is lean and moist, with a sweetly mild but distinctive flavor. The texture is lean but moist. The superb taste of this fish is evidenced by the number of other types of fish that, with just the slightest hint of red, masquerade in the marketplace as "red" snapper.

The semi-firm meat is pinkish, with yellow tones, in a raw state, turning somewhat lighter when cooked. The trademark skin is a deep red along the back, fading to a pinkish-red underside. To aid in identification, domestic American red snapper is almost always sold with the skin on.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	100
Fat Calories	12
Total Fat	1.3 g
Saturated Fat	0.3 g
Cholesterol	37 mg
Sodium	64 mg
Protein	20.5 g
Omega-3	0.4 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole
- Dressed
- H&G
- Fillets (skin-on)

Frozen

- Dressed
- H&G
- Fillets (skin-on)

COOKING TIPS

Red snapper responds well to just about any cooking method. Try steaming it whole, Chinese style. Some cooks also like to bake whole snapper stuffed with fresh herbs and seasonings. Skin-on American red snapper fillets shouldn't curl during cooking, though that of other snappers will. That's a disappointing way to find out you've paid full price for an imposter.

Substitutions Grouper, Rockfish, Ocean perch

GLOBAL SUPPLY

Mexico

United States

Sole, Dover

French	*Sole commune*
German	*Seezunge*
Italian	*Sogliola*
Japanese	*Shitabirame*
Spanish	*Lenguado*

YOU SHOULD KNOW...

When buying European sole, the smaller the fish, the better. Dovers of 1 pound or less taste better than larger soles and often cost less.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Solea vulgaris*
Market name: Sole
Common names: European Dover sole, common sole, genuine Dover sole

There are no true soles along America's eastern shore, though there are several species in European waters. The best of them is the Dover sole, a mainstay of the European seafood scene for generations and considered one of the foundations of Continental cuisine. This thick-bodied flatfish never gets much longer than 20 inches and, like other soles, has its eyes on the right-hand side. Don't confuse the European Dover sole with America's West Coast "Dover" sole (*Microstomus pacificus*). They are not the same fish. The geographical title "Dover" was tacked on to the true sole because the English town of Dover could supply more fish for London's Billingsgate market than any other fishing village. But, despite its name, Dover sole is caught in other places. This flatfish ranges from the Mediterranean to the North Sea and is usually found in shallow waters. The best grounds are said to be the North Sea and the Bay of Biscay. Dover sole is landed by trawlers.

PRODUCT PROFILE

Few fish command more respect in culinary circles than the true Dover sole, which yields thin yet firm fillets that hold together well in many preparations. The raw meat is glistening white and dense and cooks up white. The flavor of the Dover sole is mild and sweet.

One fan of Dover sole describes the fish as being "more like a meat. It doesn't have the texture of a normal fish." Despite its delicate flavor, it's able to stand up to the heavy sauces favored by European chefs.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (mixed species, raw)

AMOUNT PER SERVING	
Calories	91
Fat Calories	16.2
Total Fat	1.2 g
Saturated Fat	0.3 g
Cholesterol	48 mg
Sodium	81 mg
Protein	18.8 g
Omega-3	0.2 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Like all flatfish, Dover sole yields a thin fillet, which makes it prone to overcooking. As a result, it's better suited to poaching, steaming or saucing than to dry-heat methods like baking or broiling. When sautéing, slip a slice of raw potato under the thin part of the tail to allow for more even cooking. Dover sole is considered excellent cooked on the bone. In fact, in England, the fish is often served whole and filleted at the table.

Substitutions Flounder, Other soles

GLOBAL SUPPLY

Africa
France
Italy
Netherlands
UK

COOKING METHODS

- ☐ Bake
- ☐ Broil
- ☐ Fry
- ☐ Grill
- ■ Poach
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

- Dressed
- Fillets

Frozen

- Dressed
- Fillets

Sturgeon

French	*Esturgeon blanc*
German	*Sacramento-Stör*
Italian	*Storione*
Japanese	*Chôzame*
Spanish	*Esturión blanco*

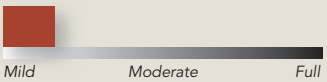
YOU SHOULD KNOW...

Beware of green sturgeon being passed off for the more expensive white. Green sturgeon have orange to reddish meat and slimmer, greenish bodies; white sturgeon are light gray in color.

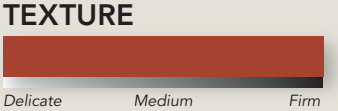
Scientific name: *Acipenser transmontanus*
Market name: Sturgeon
Common names: White sturgeon, Oregon sturgeon, Sacramento sturgeon

The prehistoric sturgeon was once abundant in the United States, consumed on both coasts and exported to Europe, where the roe was processed as caviar. By the end of the 19th century, stocks had collapsed, and today, wild fish are almost impossible to obtain. Of the seven North American species of sturgeon, only two — white and green (*Acipenser medirostris*) — are still harvested on the West Coast on a very limited scale. Most sturgeon now on the market is white sturgeon, farm-raised in California. Said to resemble the famed beluga, white sturgeon is prized for its superior flavor. Though wild fish lived for 100 years and reached weights of 2,000 pounds, market size of a full-grown farmed sturgeon is 18 to 22 pounds. The fish are cartilagenous, with no internal skeleton. Instead of scales, they have rows of sharp, bony shields or plates, called "buttons," along their bodies.

FLAVOR



TEXTURE



PRODUCT PROFILE

As farmed sturgeon are raised in controlled environments, quality should be consistently good. Wild sturgeon can vary in flavor, depending on their diet and whether they are caught in brackish or fresh water. Farmed white sturgeon has a mild, delicate flavor, less pronounced than that of green sturgeon.

The lean flesh is firm and meaty, similar in texture to chicken breast or veal. Raw sturgeon is pale pink and cooks up white. The tough skin is inedible.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	105
Fat Calories	36
Total Fat	4 g
Saturated Fat	0.9 g
Cholesterol	60 mg
Sodium	54 mg
Protein	16.1 g
Omega-3	0.3 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Sturgeon is a good fish for meat or chicken eaters because of its solid texture. Use it in recipes calling for veal. It also marinates well. A simple recipe from one sturgeon farmer calls for sautéing sturgeon fillets after seasoning with salt, pepper, lemon juice and Worcestershire sauce and rolling in flour. Sauté in hot butter only 2 to 3 minutes per side. Overcooking will toughen sturgeon.

Substitutions Tuna, Swordfish, Shark

GLOBAL SUPPLY

COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- ■ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Fresh

- Bullets (H&G, tail and fins removed)
- Fillets
- Steaks

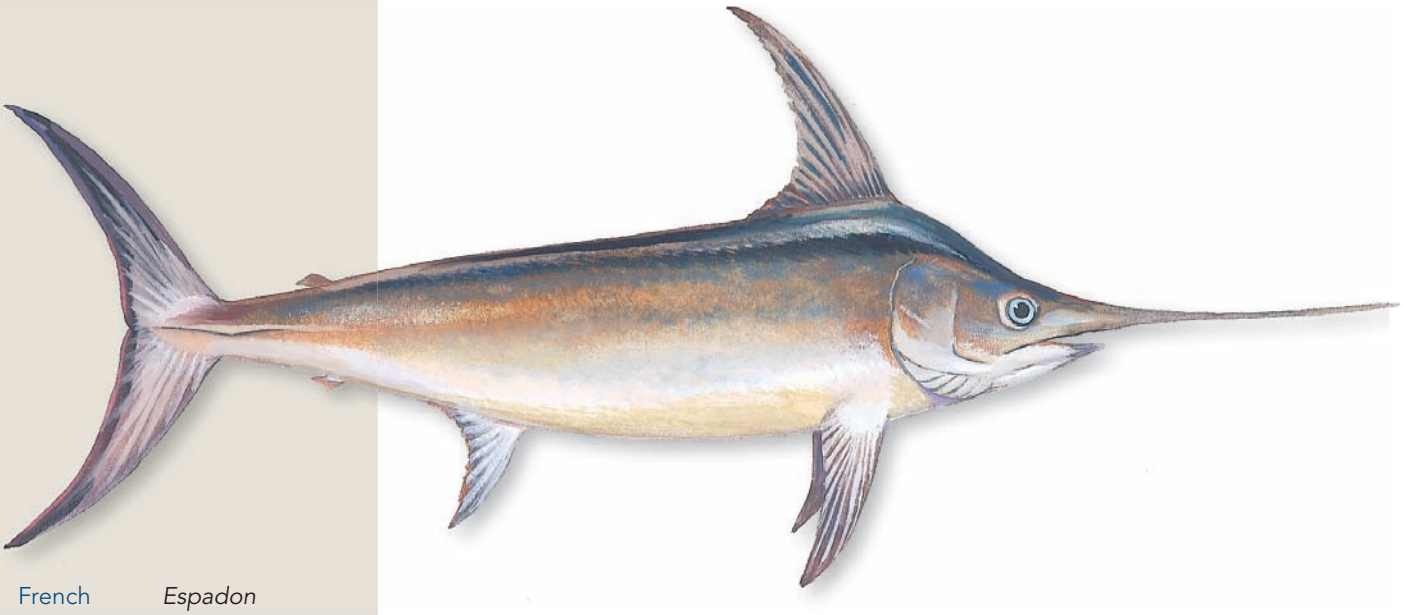
Frozen

- Bullets
- Fillets
- Steaks

Value-added

- Smoked
- Caviar

Swordfish

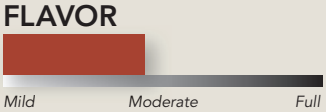


French	*Espadon*
German	*Schwertfisch*
Italian	*Pesce spada*
Japanese	*Mekajiki*
Spanish	*Pez espada*

YOU SHOULD KNOW...

Because swordfish has high levels of methylmercury, the FDA advises pregnant and nursing women, women of childbearing age and young children to avoid eating swordfish meat.

FLAVOR



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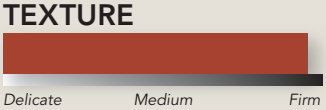


Scientific name: *Xiphias gladius*
Market name: Swordfish
Common names: Broadbilled swordfish, broadbill, espada, emperado

There is only one species of swordfish, *Xiphias gladius.* This nonschooling fish roams temperate and tropical seas worldwide and is hunted by more than 30 nations. Swordfish harvesting is governed by the International Commission for the Conservation of Atlantic Tunas. U.S. Atlantic fishermen operate under a strictly enforced ICCAT quota, but not all ICCAT nations observe their quotas. Swordfish grow to over 1,000 pounds but average 50 to 200 pounds. Most are caught by longline, the rest by gillnet and a very small amount by harpoon. The fishery is conducted at night (except the harpoon fishery). The best catches from the longline fleet come on the full moon, when nights are bright and swordfish are feeding heavily. Thus, the best catches occur during the final quarter of the moon. The opposite is true for gillnet fisheries. The darker the night, the better the fishing (because swordfish can't see the net). Generally speaking, longlined fish are considered the best. Frozen-at-sea swordfish, known as "clipper," is often a high-quality product and less expensive than fresh sword, which can be less fresh than FAS.

PRODUCT PROFILE

Swordfish is moist and flavorful with a slightly sweet taste. Steaks have a moderately high oil content and a firm, meaty texture. The flesh color can vary from white and ivory to pink and orange. Color variation does not indicate quality, and all swordfish turns beige after cooking.

Swordfish steaks have a whorling pattern and shouldn't be confused with the mako shark's more circular meat pattern. Swordfish also has a smooth skin; mako's is rough.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	121
Fat Calories	36
Total Fat	4.0 g
Saturated Fat	1.1 g
Cholesterol	39 mg
Sodium	90 mg
Protein	19.8 g
Omega-3	0.6 g

Source: USDA

COOKING TIPS

Any recipe that works for tuna will work for swordfish. While traditionally swordfish is served baked with a slice of lemon, more chefs are preparing it in ways that stretch it, like swordfish kebabs with dipping sauces. Swordfish is excellent for marinating and grilling. It can also be easily cooked from a frozen state. For moist grilled swordfish, select steaks that are at least 1 1/4 inches thick. Baste with olive oil and lemon juice before and during cooking.

Substitutions Halibut, Mako shark, Yellowfin tuna

GLOBAL SUPPLY

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [ ] Poach
- [ ] Sauté
- [x] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

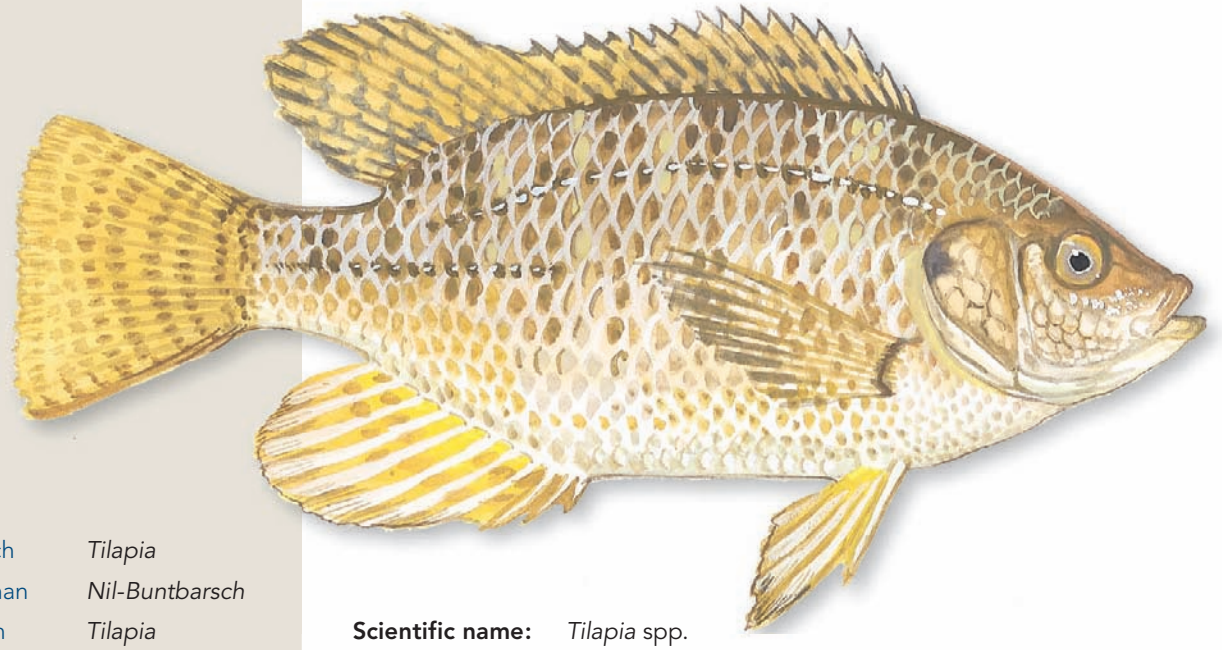
Fresh

- H&G
- Sides, or "halves"
- Loins, or "quarters"
- Steak-ready loins
- Wheels
- Chunks, slabs or sections
- Steaks

Frozen

- H&G
- Sides
- Loins
- Steak-ready loins
- Wheels
- Chunks
- IQF steaks

Tilapia



French	*Tilapia*
German	*Nil-Buntbarsch*
Italian	*Tilapia*
Japanese	*Telapia*
Spanish	*Tilapia*

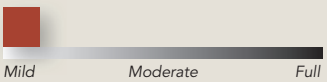
YOU SHOULD KNOW...

Tilapia absorbs flavor from the water it's raised in, so buy fish from a reliable source. If you buy on the basis of price alone, expect to get an inferior product.

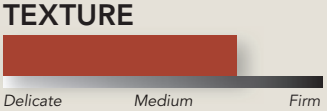
Scientific name: *Tilapia* spp.
Market name: Tilapia
Common names: St. Peter's fish, sunfish

Tracing its origin to the Nile River, tilapia has been farm raised for decades and is cultivated in warm waters the world over. It is the second-most cultured group of fish in the world, exceeded only by carp. Domestically, tilapia are cultured in the southern and western states. Costa Rica and Colombia are major suppliers of fresh product. Three of the most common species cultivated in the United States are *Tilapia nilotica*, an emerald-green tilapia known for its high yield and rapid growth; *T. aureus,* a cold-resistant strain; and *T. mossambica,* noted for its reddish skin color, which makes it popular for the live market and display tanks. Legend has it that tilapia was the fish Jesus of Nazareth multiplied a thousandfold to feed the masses. This gave the species its frequently used name of "St. Peter's fish," a name the FDA does not allow to be marketed. Whole tilapia normally range from 1 to 2 pounds. Some buyers prefer fish larger than 2 pounds.

FLAVOR



TEXTURE



PRODUCT PROFILE

The mild, sweet tasting, lean-meated tilapia has a slightly firm, flaky texture. Many compare the mild taste of tilapia to that of another farm-raised success story, catfish. Raw meat is white to pinkish-white and may have a thin layer of darker muscle tissue just below the skin side of fillets. The cooked meat is white and lean with tender flakes.

Water quality and feed are critical to the raising of premium tilapia. Poor quality results in an off-flavor or a muddy, grassy taste similar to that of wild-run catfish.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	96
Fat Calories	15
Total Fat	1.7 g
Saturated Fat	0.8 g
Cholesterol	50 mg
Sodium	52 mg
Protein	20.1 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Tropical Aquaculture Products

COOKING TIPS

Tilapia is highly versatile, but whatever cooking method you choose, stick with a subtle sauce to help avoid overpowering tilapia's delicate flavor. The tilapia's attractive skin — gold, red or black and white — should be featured but not necessarily eaten, as it can have a bitter taste.

Substitutions Catfish, Flounder, Orange roughy

GLOBAL SUPPLY

Africa
China
Colombia
Costa Rica
Ecuador
Honduras
Indonesia
Jamaica
Thailand

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

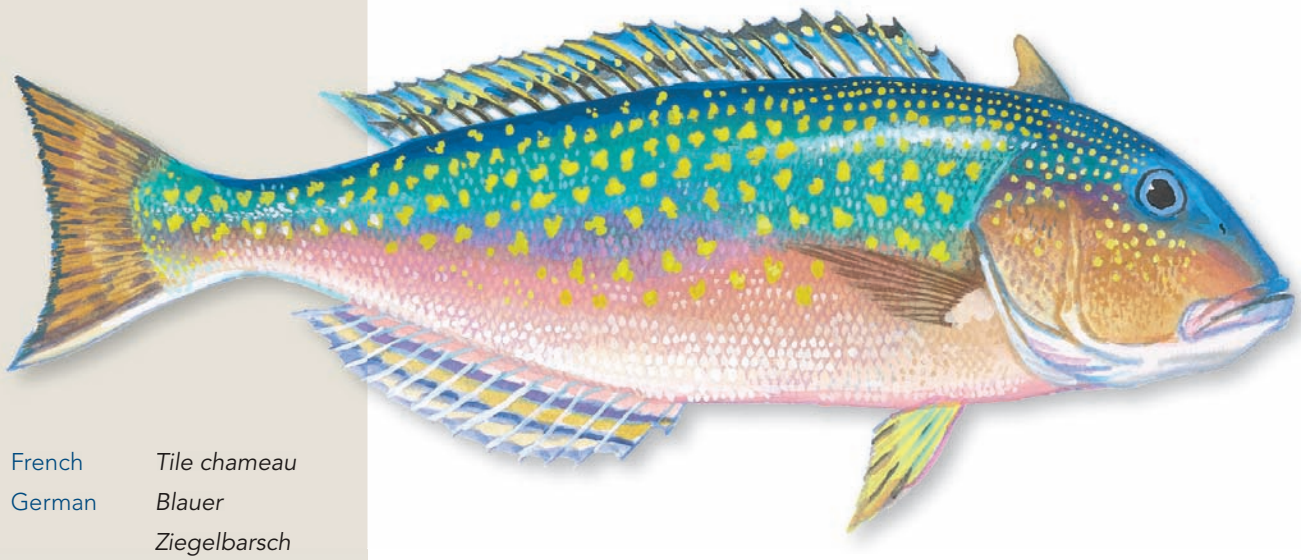
Live

Fresh
- Whole
- H&G
- Fillets (boneless, skin-on/skinless)

Frozen
- Whole
- H&G
- Fillets (boneless, skin-on/skinless)

Value-added
- Frozen, breaded fillets
- Marinated or sauced portions

Tilefish



French	*Tile chameau*
German	*Blauer Ziegelbarsch*
Italian	*Tile gibboso*
Japanese	*Amadai*
Spanish	*Blanquillo camello*

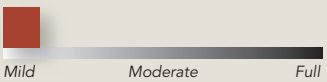
Scientific name: *Lopholatilus chamaeleonticeps*
Market name: Tilefish
Common names: Golden tilefish, blue tilefish, great northern tilefish

YOU SHOULD KNOW...

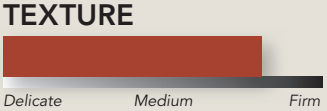
Because tilefish contain high levels of methylmercury, the FDA advises pregnant and nursing women, women of childbearing age and young children to avoid eating tilefish meat.

The colorful tilefish, known as the "clown of the sea," may look like a tropical species, but it is found from Florida to as far north as Nova Scotia. Tilefish inhabit a narrow stretch of ocean floor in a band of warm water along the upper reaches of the continental slope. The major fishing grounds are off eastern Florida, southern New Jersey and the tip of Long Island, N.Y. Fishermen target tilefish with longlines; it is a selective fishery with little bycatch. Whether from Miami or Montauk, almost all tilefish is sold fresh, graded and priced by size: The bigger the fish, the higher the per-pound price. But just because smaller tilefish are less expensive than large ones, that doesn't mean you've got a bargain. The smaller fish have a shorter shelf life, and their flesh tends to be softer. Tilefish can grow up to 4 feet and 80 pounds, although 5 to 10 pounds are average in the commercial catch. Fish from deeper waters dine primarily on crabs, giving them a firmer texture and sweeter flavor than those harvested in shallower waters.

FLAVOR



TEXTURE



PRODUCT PROFILE

This species is sometimes called the rainbow tilefish for its lovely blue, green, rose and yellow coloration. Out of the water, the colors fade.

Tilefish yield thick fillets with a row of pinbones. The raw meat is pinkish-white but cooks up white with a firm, flaky texture. The flavor is mild but distinctive, often compared to lobster or crab, which is not surprising, since the tilefish's diet is largely crustaceans.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	96
Fat Calories	20.7
Total Fat	2.3 g
Saturated Fat	0.4 g
Cholesterol	50 mg
Sodium	53 mg
Protein	17.5 g
Omega-3	0.5 g

Source: USDA
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Firm and mild-tasting, tilefish offers chefs many options. Pan searing is a good choice of methods, since tilefish holds together well, a quality that also makes it good in soups and stews. Cook the thick fillets at a high initial heat to help seal in juices and keep the meat moist. With its firm texture and clean taste, tilefish also is a good candidate for sashimi or sushi.

Substitutions Monkfish, Snapper, Grouper

GLOBAL SUPPLY

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

- Head-on, dressed
- Fillets (skin-on)
- Steaks

Frozen

- Fillets (skin-on, bone-in)
- Steaks

Trout, rainbow

French	*Truite arc-en-ciel*
German	*Regenbogenforelle*
Italian	*Trota irdea*
Japanese	*Nijimasu*
Spanish	*Trucha arco iris*

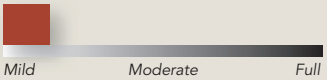
YOU SHOULD KNOW...

"Boned" does not mean boneless, it only means fewer bones. In a truly boneless trout fillet — either a butterfly fillet or a natural fillet — all pinbones have been removed.

Scientific name: *Oncorhynchus mykiss*
Market names: Rainbow trout, steelhead
Common name: Rainbow trout

Trout represents the oldest aquaculture industry in North America, dating back to the first trout hatchery in the 1880s. Today, Idaho accounts for 70 percent of the rainbow trout raised in the United States. All rainbow trout sold domestically are farmed, either in concrete raceways or earthen ponds. In 1989, the Latin name *Oncorhynchus mykiss* replaced its predecessor, *Salmo gairdneri*. So, when looking up information in older technical and cooking publications, *S. gairdneri* is the name to look for. However, the rainbow trout is still a member of the salmon family. It is silver with black spots on the sides, back and fins. The term rainbow can be misleading, since the skin is not rainbow hued but pinkish lavender. Steelhead trout is a seagoing strain of rainbows. Rainbows usually refer to freshwater fish. Farm-raised rainbows reach market size of 8 to 10 ounces in eight to 12 months.

FLAVOR



TEXTURE

PRODUCT PROFILE

Rainbow trout meat is mild, with a delicate, nut-like flavor. The flesh is tender, flaky and soft. The flesh of rainbow trout is white, pink or orange. When the meat is cooked, it has a delicate flake and the color pales.

Trout feed can contain pigments to produce desired flesh colors. The fillets need to be firm, resilient and have a fresh appearance. The skin of the rainbow trout should be dark, shiny and have a slippery feel. Avoid frozen fish that looks dried out or has gray flesh.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	138
Fat Calories	49
Total Fat	5.4 g
Saturated Fat	1.6 g
Cholesterol	59 mg
Sodium	35 mg
Protein	20.9 g
Omega-3	0.9 g

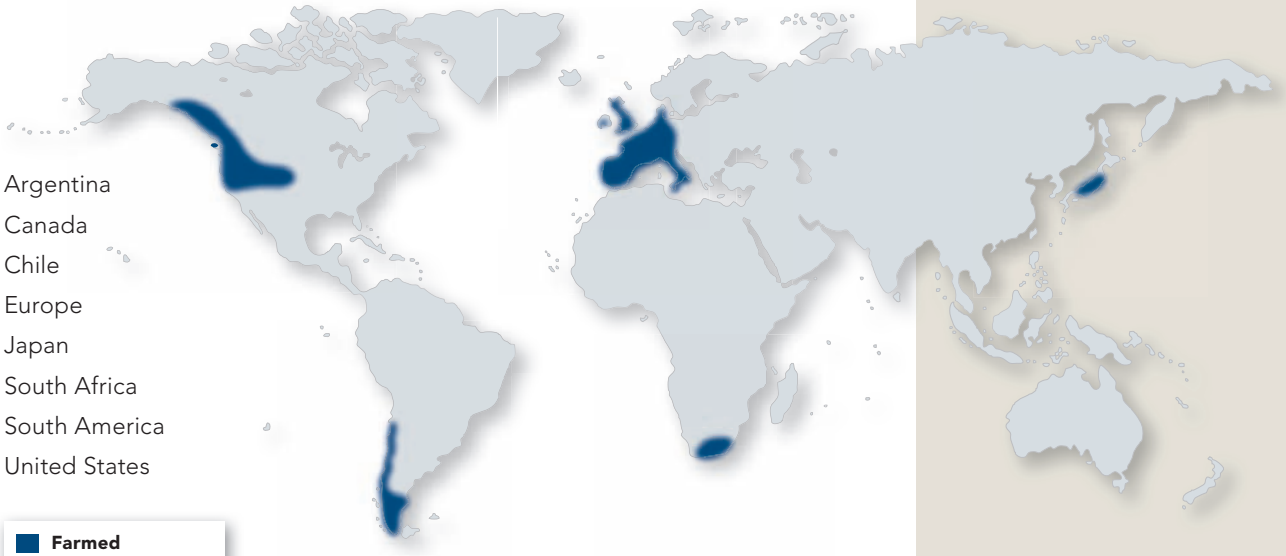
Source: USDA
Photo courtesy of Clear Springs Foods

COOKING TIPS

Rainbow trout are just the right size for individual servings. Don't overpower the delicate taste of rainbow trout with strong sauces. A little butter, lemon and parsley is usually all you need to bring out the delicate flavors of this fish. Try trout with mint and garlic stuffing for a pleasant change.

Substitutions Arctic char, Salmon

GLOBAL SUPPLY



COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- Dressed
- Boned (head-on/headless)
- Fillets

Frozen
- Dressed
- Boned (head-on/headless)
- Fillets

Value-added
- Breaded
- Stuffed
- Smoked

Tuna, albacore

French	*Germon*
German	*Weisser Thun*
Italian	*Tonno*
Japanese	*Binnagamaguro*
Spanish	*Albacora*

YOU SHOULD KNOW...

Because of high methylmercury content in albacore, the FDA advises persons at risk to limit consumption of this tuna to 6 ounces per week.

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FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Thunnus alalunga*
Market name: Tuna
Common names: Albacore, longfin tuna, tombo (Hawaiian)

Albacore is best known as America's highest-grade, "white meat" canned tuna. In fact, it's the only tuna meat allowed to be labeled "white meat." However, it has also developed a reputation out of the can in fresh and frozen markets. The albacore has a streamlined, torpedo-shaped body. It sports the blue and silver coloration of the other tunas but has longer pectoral fins. A schooling fish, albacore is caught in tropical and sub-tropical waters worldwide by trollers and longliners. In the Atlantic, albacore migrate as far north as the Bay of Biscay. Along the North American side of the Atlantic, they are sparse. In the Pacific fisheries, they exist off the West Coast and in the waters around Hawaii. The fish can range in size from 5 to 100 pounds, although the average market weight is between 10 and 30 pounds. High-grade "clipper" albacore loins, from which steaks can easily be taken, have been cut from freshly landed tuna and frozen onboard. Yield and quality are excellent. Tuna must be kept well chilled from the moment of harvest to prevent development of histamine, which can result in scromboid poisoning.

PRODUCT PROFILE

Albacore has a mild, rich taste and a firm, steaky texture, with large, moist flakes. Albacore meat is less dense than bluefin tuna, though it is one of the fattiest species, with more omega-3 than the rest of the tunas.

Albacore has the lightest-colored meat of all the tunas, though it can range from light beige to almost brown when raw. All albacore flesh becomes off-white after cooking. Albacore meat is not as firm as yellowfin or bluefin, which makes it less suited for sashimi.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	152
Fat Calories	16
Total Fat	1.8 g
Saturated Fat	0 g
Cholesterol	58 mg
Sodium	47 mg
Protein	30 g
Omega-3	N/A

Source: FDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Albacore, like the other tunas, should appeal to meat lovers, especially those who like to grill. Albacore cooks quickly, and for maximum flavor is best served rare. Try searing albacore steaks to serve with a highly seasoned sauce. Marinating before cooking and basting during will keep albacore moist and prevent it from turning tough.

Substitutions Other tunas, Mako shark, Swordfish

GLOBAL SUPPLY

COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

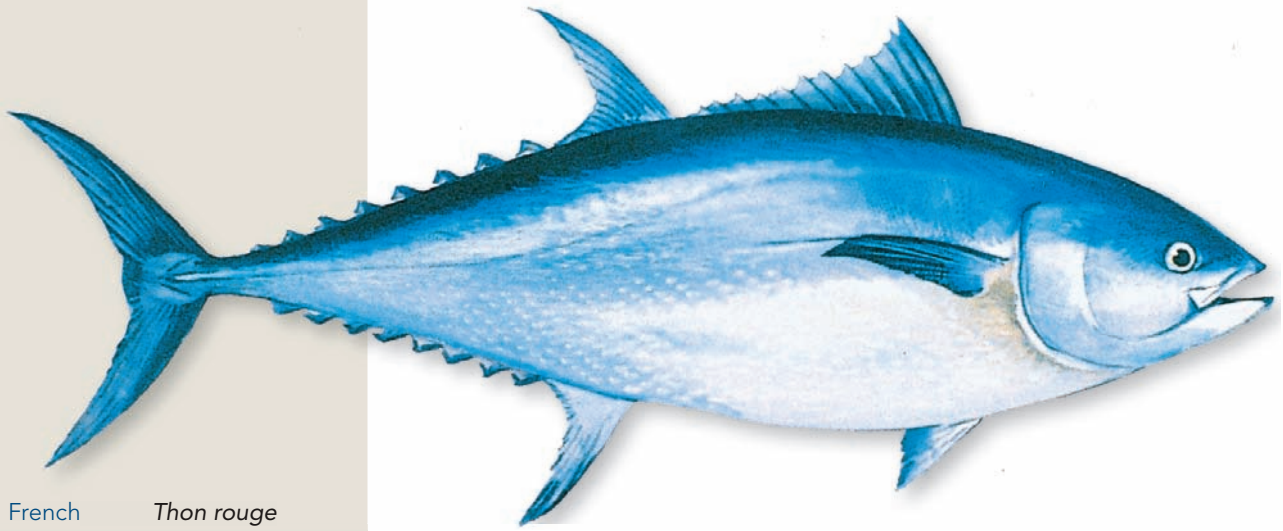
PRIMARY PRODUCT FORMS

Fresh
- Whole
- H&G
- Loins
- Steaks

Frozen
- Whole
- H&G
- Loins
- Steaks

Value-added
- Canned
- Smoked

Tuna, bluefin



French	*Thon rouge*
German	*Roter Thun*
Italian	*Tonno*
Japanese	*Honmaguro*
Spanish	*Atún rojo*

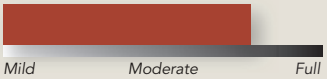
YOU SHOULD KNOW...

Investigate the grading system and suppliers before buying fresh bluefin. If you don't plan to serve bluefin raw, lower grades may better suit your needs and budget.

Scientific name: *Thunnus thynnus*
Market name: Tuna
Common names: Bluefin tuna, giant bluefin, northern bluefin, Atlantic bluefin

Fishermen call them giants for a good reason: The bluefin tuna is the largest of the commercially harvested tuna species, with a record weight of just over 2,000 pounds and a length of over 12 feet. This fast-swimming migratory species occupies temperate and tropical waters worldwide. Over half the global catch comes from biologically separate stocks in the eastern and western Atlantic Ocean. The Mediterranean is also a historic area for bluefin. Bluefin is caught by a variety of gear types, including purse seine, harpoon, longline, troll, handline and rod and reel. The giant bluefin has a blue-black upper body and silvery white coloring on the sides and belly. The finlets are edged in black. Despite its potential large size, commercially caught bluefins are usually between 200 and 400 pounds. Bluefin is graded by taking "plugs" of flesh to test for fat content and color, critical factors in the price structure.

FLAVOR



TEXTURE

PRODUCT PROFILE

Because of its high fat content, bluefin is especially prized as a raw product and is marketed in three grades. No. 1 "sashimi-grade," the freshest and fattiest, goes to the Japanese market. No. 2, next best, is "grill grade." Nos. 3 and 4 reflect diminished quality.

Bluefin is the darkest and fattiest of any tuna, and its uncooked meat is red. When cooked, the meat turns firm and an off-white or ivory color. The flavor is distinctive. The flesh has the firmness and appearance of beef steaks. Raw bluefin meat can be brined overnight to mellow the flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	144
Fat Calories	44
Total Fat	4.9 g
Saturated Fat	1.3 g
Cholesterol	38 mg
Sodium	39 mg
Protein	23.3 g
Omega-3	1.3 g

Source: USDA

Photo courtesy of American Spice Trade Association

COOKING TIPS

Overcooked tuna is tough and tasteless. When broiling or grilling the meaty bluefin, treat it as you would sirloin steak; it's best if done on the rare side. The color will be nice and light, the meat firm and the flavor intense. Serve a nice red wine with bluefin steaks.

Substitutions Swordfish, Other tunas, Mako shark

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

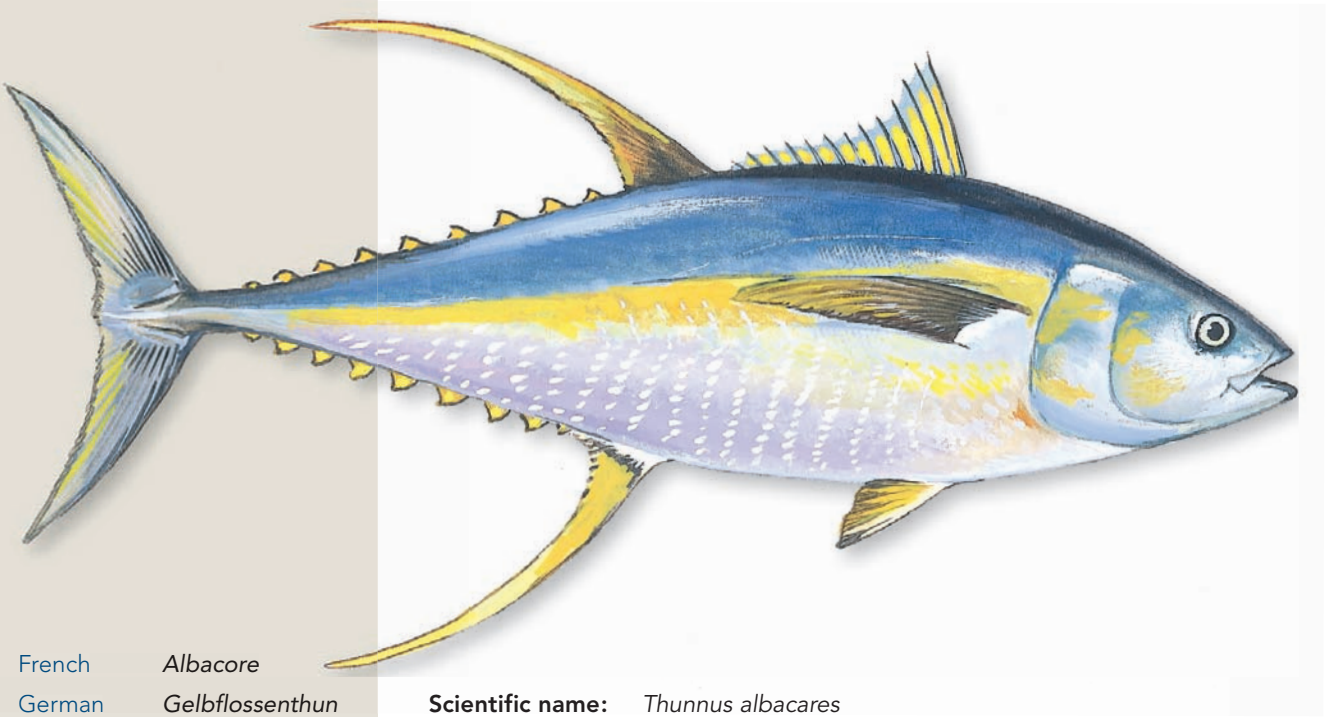
PRIMARY PRODUCT FORMS

Fresh
- H&G
- Loins
- Chunks
- Steaks

Frozen
- H&G
- Loins
- Chunks
- Steaks

Value-added
- Canned

Tuna, yellowfin



French	*Albacore*
German	*Gelbflossenthun*
Italian	*Tonno albacora*
Japanese	*Kihada*
Spanish	*Rabil*

Scientific name: *Thunnus albacares*
Market name: Tuna
Common names: Yellowfin tuna, Pacific yellowfin, ahi (Hawaiian), "light-meat" tuna

YOU SHOULD KNOW...

Fresh yellowfin is more perishable than other tuna species. Improperly handled yellowfin, especially allowing viscera to remain in an unfrozen fish, can produce histamine, which causes scombroid poisoning.

Yellowfin, as its name implies, is distinguished from other tunas by a long, bright-yellow dorsal fin and a yellow strip down its side. It's also more slender than bluefin. With its flashy markings, the yellowfin tuna is especially impressive at night. Fishermen say that when watching yellowfin feed, it's easy to see why they carry the Hawaiian name *ahi*, or fire. Yellowfin is the most tropical species of tuna, abundant in warm waters throughout the Pacific and Atlantic, often mixed with other species, especially skipjack tuna. The fish is most often harvested by purse seine, but the best-quality yellowfin is caught by hook and line. Market size runs from 7 1/2 to 20 pounds. High-quality fresh yellowfin comes from Hawaii, Florida, Mexico, southern California and the Gulf of California. Tuna is often canned in countries other than those harvesting it. Top canning countries exporting tuna to the United States include Thailand, the Philippines and Indonesia.

FLAVOR

TEXTURE

PRODUCT PROFILE

Yellowfin tuna has a mild, meaty flavor — similar, some say, to swordfish. It's more flavorful than albacore, but leaner than bluefin. The meat is bright red in its raw state but, when cooked, turns brown to grayish-tan, firm and moist, with large flakes. Yellowfin is also served raw as sashimi and in sushi. Canned product (light-meat tuna) is a bit darker than canned albacore and is often blended with skipjack tuna.

Look for tuna meat with a glistening, wet look. The ideal is bright translucent red. Fat is desirable, as more fat means more flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	108
Fat Calories	8.1
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	45 mg
Sodium	37 mg
Protein	23.4 g
Omega-3	0.2 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING TIPS

Yellowfin is excellent raw, but for grilling and broiling, cut steaks 1 1/2 inches thick. The tuna needs little flavor enhancement; just brush with olive oil and sprinkle with seasoning. For a milder taste, remove the dark lateral line from the meat. Tuna can also marinate for several hours without becoming "cooked." Try a marinade of white wine, a little oil and some brown sugar for an hour or two before grilling.

Substitutions Swordfish, Mako shark, Other tunas

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- □ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- □ Steam

PRIMARY PRODUCT FORMS

Fresh

- H&G
- Chunks
- Loins
- Steaks

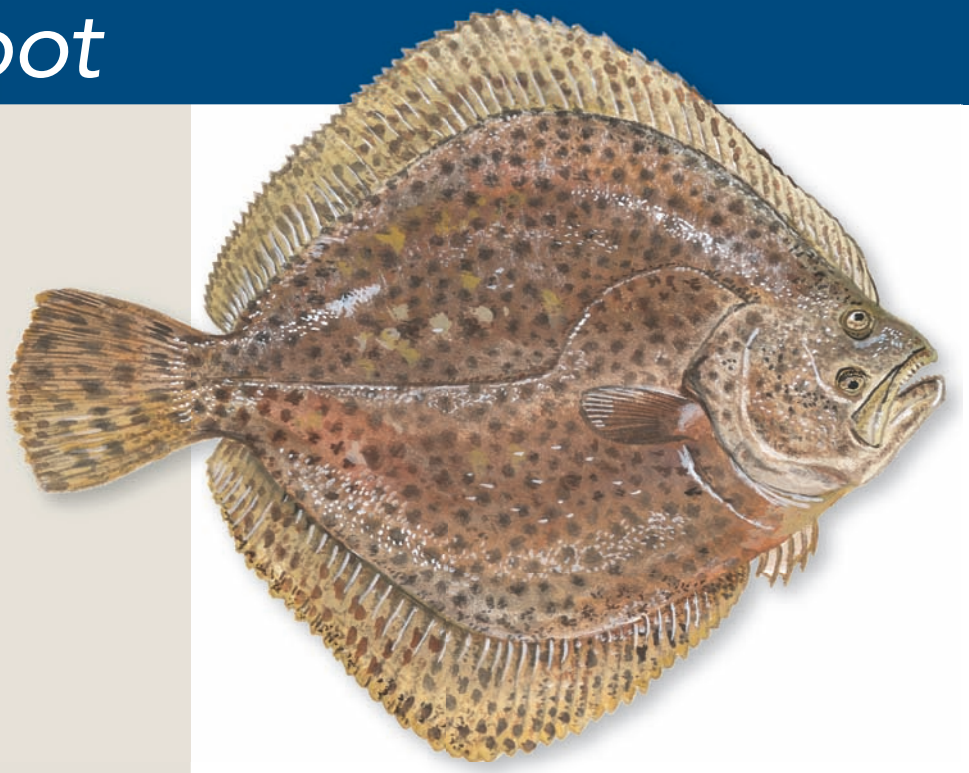
Frozen

- H&G
- Chunks
- Loins
- Steaks

Value-added

- Canned
- Pre-marinated steaks
- Smoked strips and jerky
- Sashimi
- Burgers, patties

Turbot



French	*Turbot, Barbue*
German	*Steinbutt*
Italian	*Rombo chiodato*
Spanish	*Sollo*

YOU SHOULD KNOW...

Make sure you're getting true turbot, not Greenland turbot or one of the soft-fleshed Pacific pretenders, like arrowtooth flounder. Most turbot alternatives are sold as frozen fillets, while the real thing is sold as whole, fresh fish.

FLAVOR

TEXTURE

Scientific name: *Scophthalmus maximus*
Market name: Turbot
Common names: True turbot, European turbot

Found on menus in the whitest of white-tablecloth restaurants, turbot (pronounced *tur*-bet) is a favored flatfish for discerning chefs. A member of the Bothidae, or left-eyed, family of flounders, turbot (previously known as *Psetta maxima*) is found in shallow inshore waters throughout the Mediterranean and north to the Norwegian Sea. Primary producers are the Netherlands, Denmark and the United Kingdom. Global supplies are limited, which accounts for the high price this fish commands. Farmed production in France, Spain and Chile is supplementing wild harvests. Farm-raised turbot are generally smaller (1 to 4 pounds) and milder in flavor than wild turbot, which can reach 30 pounds but average 10 pounds. Several lesser-quality species of flatfish are sometimes passed off as European turbot, including Greenland turbot and some West Coast flounders. Inferior in flavor and with softer flesh, these flatfish can't compare to the real turbot.

PRODUCT PROFILE

Turbot has gleaming flesh that retains its bright-white appearance when cooked. The firm meat has a large flake and an excellent mild flavor.

Like all flatfish, a turbot yields four fillets, with meatier back fillets than belly portions. Fillets from a 3- to 4-pound turbot are quite meaty; those from smaller fish can be rather thin. A rim of fatty tissue on the fin side of each fillet contains a row of "kernels" of snow-white meat.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	95
Fat Calories	26.1
Total Fat	2.9 g
Saturated Fat	0.8 g
Cholesterol	48 mg
Sodium	150 mg
Protein	16 g
Omega-3	N/A

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [ ] Broil
- [ ] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

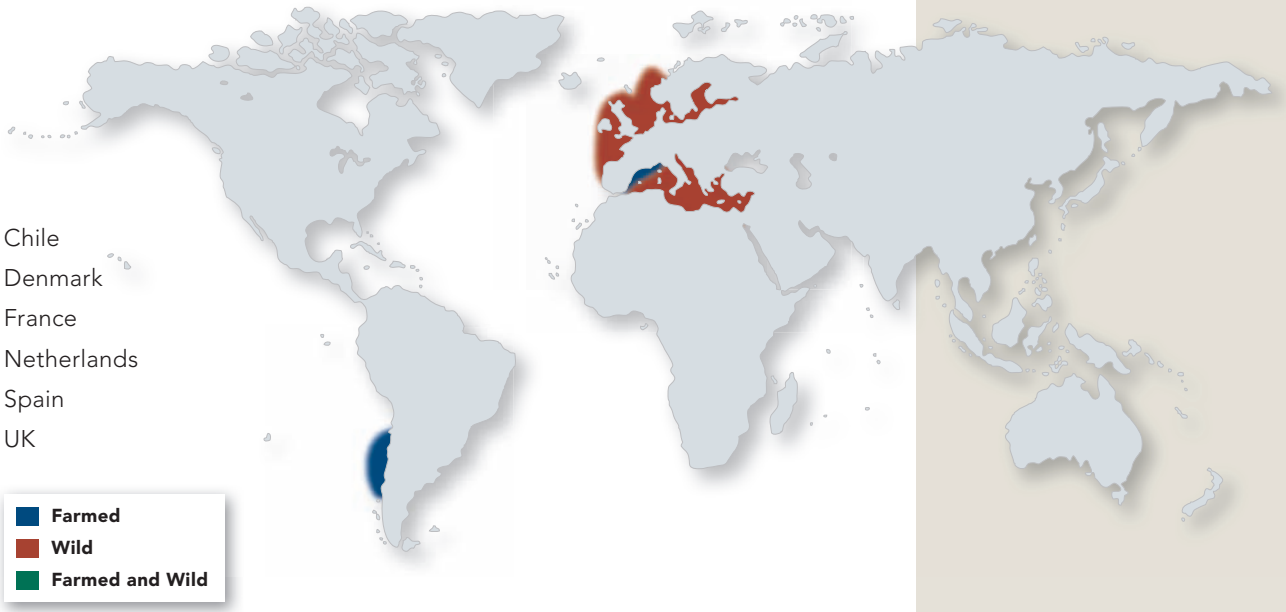
Whole, gutted

COOKING TIPS

Treat turbot with the respect it deserves, using preparations that highlight the delicate flavor and bright-white flesh. Turbot is good baked whole; the bones add flavor. Fillets can be overcooked in dry heat; steaming, poaching and pan-frying are preferable to grilling.

Substitutions Pompano, Dover sole

GLOBAL SUPPLY



Wahoo

French	*Thazard bâtard*
German	*Peto*
Italian	*Waho, maccarello striato*
Japanese	*Kamasu-sawara*
Spanish	*Peto, Sierra canalera*

YOU SHOULD KNOW...

To extend wahoo's shelf life, store whole, hanging with head down, and don't fillet the fish until just before using.

Scientific name: *Acanthocybium solandri*
Market name: Wahoo
Common names: Ono, kingfish, peto, guarapucu, thazard bâtard

Wahoo, a member of the Scombridae family of mackerels and tunas, is closely related to the king mackerel. Hawaiian lore has it that the name wahoo comes from European explorers' misspelling of "Oahu" on early maps, since the fish was abundant around that island. The fish's alternate name, ono, is derived from the Hawaiian word *òno*, meaning "good to eat." Wahoo are found in tropical and subtropical waters of the Atlantic, Pacific and Indian oceans, but the bulk of the global harvest is from the Caribbean and South Pacific. Most domestic supplies are from Hawaii. About 50 percent of Hawaii's commercial wahoo harvest is taken by trollers. The remainder is caught on longline gear. Some wahoo is also landed in Florida as tuna and swordfish bycatch. Wahoo may grow to more than 100 pounds round weight, but the usual size of fish caught off Hawaii is 8 to 30 pounds.

FLAVOR

TEXTURE

PRODUCT PROFILE

Raw wahoo meat is lighter in color than that of its mackerel cousins and has less of the red muscle meat. The pale-pink flesh cooks up white.

Wahoo is mild-tasting, with a firm, lean texture and large, circular flake. Grilled wahoo has been compared to chicken or veal in flavor.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	167
Fat Calories	15
Total Fat	9.4 g
Saturated Fat	2.4 g
Cholesterol	64 mg
Sodium	78 mg
Protein	19.3 g
Omega-3	N/A

Source: NOAA FishWatch

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ☐ Poach
- ■ Sauté
- ■ Smoke
- ☐ Steam

COOKING TIPS

Although a versatile fish, wahoo benefits from cooking methods suitable for species with low fat content so the meat doesn't dry out when cooking. It cooks and tastes like an ultra-light, lean tuna. The firm flesh is good grilled or broiled, especially if marinated first to tenderize it and enhance the mild flavor.

Substitutions Swordfish, Tuna

PRIMARY PRODUCT FORMS

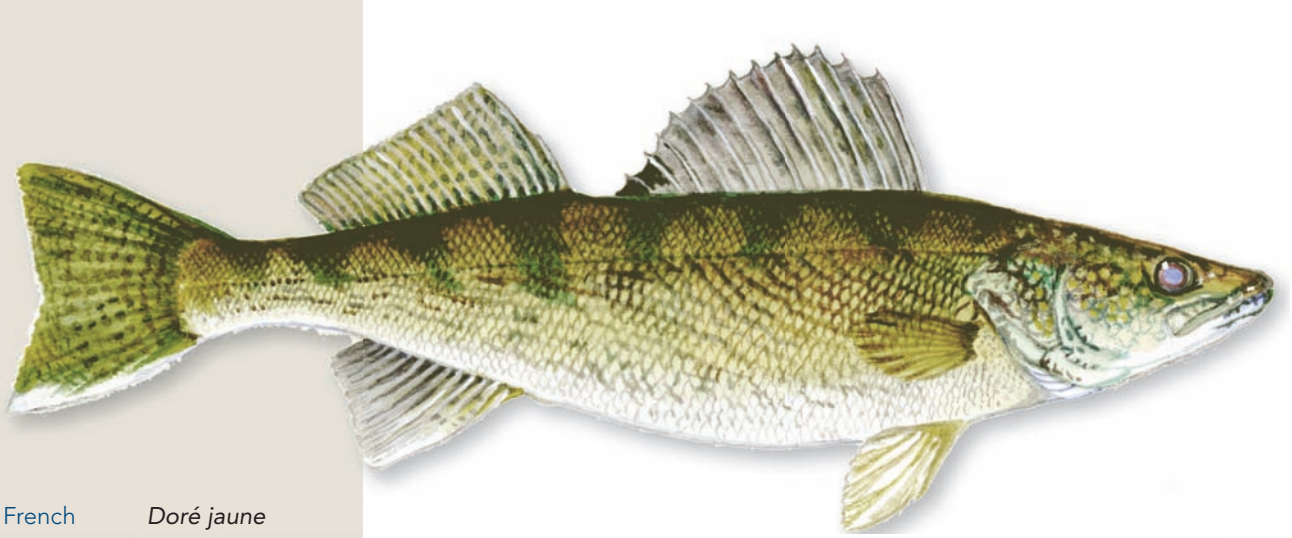
Fresh

- Whole
- H&G
- Fillets
- Steaks

GLOBAL SUPPLY

Australia
Fiji
United States

Walleye



French	*Doré jaune*
German	*Zander*
Italian	*Sandra*
Spanish:	*Lucioperca americana*

YOU SHOULD KNOW...

Make sure the fish you're getting is authentic walleye, as substitution with European zander and crimson snapper can be a problem.

Scientific name: *Sander vitreus vitreus* (*Stizostedion vitreum*)
Market name: Walleye
Common names: Walleyed pike, yellow pike, yellow walleye, pickerel, pike-perch, dory, freshwater perch

Walleye is widely regarded as the best-tasting freshwater fish. The largest member of the perch family, it is native to lakes and streams throughout Canada and the north-central United States. However, Canada is the only commercial source of walleye, as commercial fishing and sales are banned in the United States to protect recreational fisheries. Named for its highly reflective, cat-like eyes, the walleye can reach a length of 30 inches and weight of 15 pounds, though typical market size is 1 to 5 pounds. Wildly popular with sport fishermen and increasingly popular on restaurant menus, walleye has come into increased demand, fueling research into its potential for aquaculture. To date, the species has proven difficult to farm, with mortality rates and production costs prohibitively high, so farming serves only to stock lakes for anglers. Most restaurant and retail supplies of walleye come from Lake Erie, Lake Winnipeg, Lake of the Woods and other large Canadian lakes. Although fresh and frozen walleye is available year-round, peak fresh supplies are in fall and winter.

FLAVOR

TEXTURE

PRODUCT PROFILE

Fine-flaked walleye fillets are prized for their thickness and succulent, sweet, mild flavor. The fish has few bones, which adds to its popularity.

The raw meat is a rich pink color but clear white when cooked. When checking for freshness of whole walleye, observe the flesh and skin, since you won't see clear, bright eyes even in the freshest walleye. The eyes are naturally flat and opaque.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	87
Fat Calories	11.1
Total Fat	1.2 g
Saturated Fat	0.3 g
Cholesterol	86 mg
Sodium	51 mg
Protein	19.1 g
Omega-3	0.4 g

Source: USDA
Photo courtesy of Freshwater Fish Marketing Corp.

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole, round
- Headless and dressed
- Fillets, skinless/skin-on

Frozen

- IQF fillets
- IQF fingers

COOKING TIPS

Impressively versatile, walleye can be baked, grilled, poached, stuffed, sautéed, deep-fried and used in chowder. Batter frying locks in the juiciness and is a popular treatment among walleye fans. Simple preparations are the best way to showcase the succulent, delicate flavor. For grilling, simply brush a fillet with lemon butter. If you must embellish the fish, use a light touch with sauces, such as white wine, garlic or dill.

Substitutions Yellow perch, Grouper, Snapper

GLOBAL SUPPLY

Whitefish

French	*Corégone de lac*
German	*Felchen*
Italian	*Coregone die grandi laghi*
Japanese	*Shiromasu*
Spanish	*Corégono*

YOU SHOULD KNOW...

Whitefish harvested in winter months are usually of the best quality. The meat tends to be firmer and fatter that time of year.

Scientific name: *Coregonus clupeaformis*
Market name: Whitefish
Common names: Lake whitefish, inland whitefish, Labrador white fish, shad

The name "whitefish" can be confusing, because it is often used as a generic marketing term for many saltwater species of mild-flavored, white-fleshed fish. Further, it describes at least seven distinct species of related fish, all found in Arctic and sub-Arctic fresh and salt water. The most valuable of these is lake whitefish, *Coregonus clupeaformis*, which inhabits cold, deep-water lakes in the northern United States and in Canada, which is the primary producer. These silvery, small-mouthed, freshwater fish are in the family Salmonidae. Though related to salmon and trout, they have pure-white meat and are traditionally the species used for gefilte fish. Whitefish roe, marketed as golden caviar, is highly valued. Because whitefish are harvested from cold, northern waters and are not subjected to climatic heat, the quality is generally quite good.

FLAVOR

TEXTURE

PRODUCT PROFILE

Whitefish is considered one of the best-eating freshwater fish there is. Because the fish lives in icy northern lakes, the meat has a high fat content, making it an excellent candidate for smoking. The mild flavor is more like salmon than trout. The meat is medium-firm with a large flake.

Though whitefish is a salmonid, the meat looks nothing like trout or salmon. Raw, the flesh is almost pure white, and it cooks up off-white.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	134
Fat Calories	81
Total Fat	5.9 g
Saturated Fat	0.9 g
Cholesterol	48 mg
Sodium	51 mg
Protein	19.1 g
Omega-3	1.4 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Due to a fairly high fat content, whitefish are a little more forgiving about overcooking than leaner fish. For grilling, use skin-on fillets. Whitefish can also be used in seafood chowders or salads, since the meat is solid and holds together well.

Substitutions Rainbow trout, Salmon

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [x] Grill
- [ ] Poach
- [ ] Sauté
- [x] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole, dressed
- Fillets
- Steaks

Frozen

- Whole, dressed
- Fillets
- Steaks

Value-added

- Smoked, head-on; fillets
- Roe

GLOBAL SUPPLY

Wolffish

French	*Loup Atlantique*
German	*Gestreifter Seewolf*
Italian	*Lupo di mare*
Japanese	*Taiseiyo-namazu*
Spanish	*Perro del Norte*

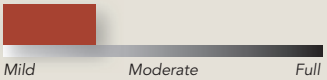
YOU SHOULD KNOW...

Properly processed wolffish fillets are always boneless. If pinbones are present in a product you buy as wolffish, you've likely been sold something other than the real thing.

Scientific name: *Anarhichas lupus*
Market name: Wolffish
Common names: Atlantic wolffish, striped wolffish, ocean catfish, seacat, lobo, ocean whitefish, rock salmon

The ferocious-looking wolffish gets its name from the sharp, protruding teeth it uses to feast on lobsters, clams and other shellfish. Found from southern New England to Greenland and the Barents Sea, the bottom-dwelling coldwater creature is primarily a bycatch of trawl fisheries targeting cod, haddock and other groundfish. Iceland, which has a directed fishery for the species, is the largest producer. Imports also come from Canada and Norway, which is developing wolffish-farming operations. The striped wolffish is one of three Atlantic species, which also include the northern (*A. denticulatus*) and the spotted (*A. minor*) wolffish. From a culinary standpoint, there's little difference among the three. Wolffish can reach 30 or 40 pounds, but market size averages 10 pounds.

FLAVOR



TEXTURE

PRODUCT PROFILE

Wolffish has long been held in high regard by European chefs, who find it an acceptable alternative to Dover sole. The lean, pearly white flesh of the wolffish has a firm texture and a mild, sweet flavor, sometimes likened to lobster. The meat has a flake similar to cod's but not as large.

Wolffish skin is edible, but since there are no scales, this species cannot be kosher.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	96
Fat Calories	21.6
Total Fat	2.4 g
Saturated Fat	0.4 g
Cholesterol	46 mg
Sodium	85 mg
Protein	17.5 g
Omega-3	0.7 g

Source: USDA

Photo courtesy of Norwegian Seafood Export Council

COOKING METHODS

- ■ Bake
- ■ Broil
- ■ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- □ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole
- H&G
- Fillets (boneless)

Frozen

- Fillets (boneless)

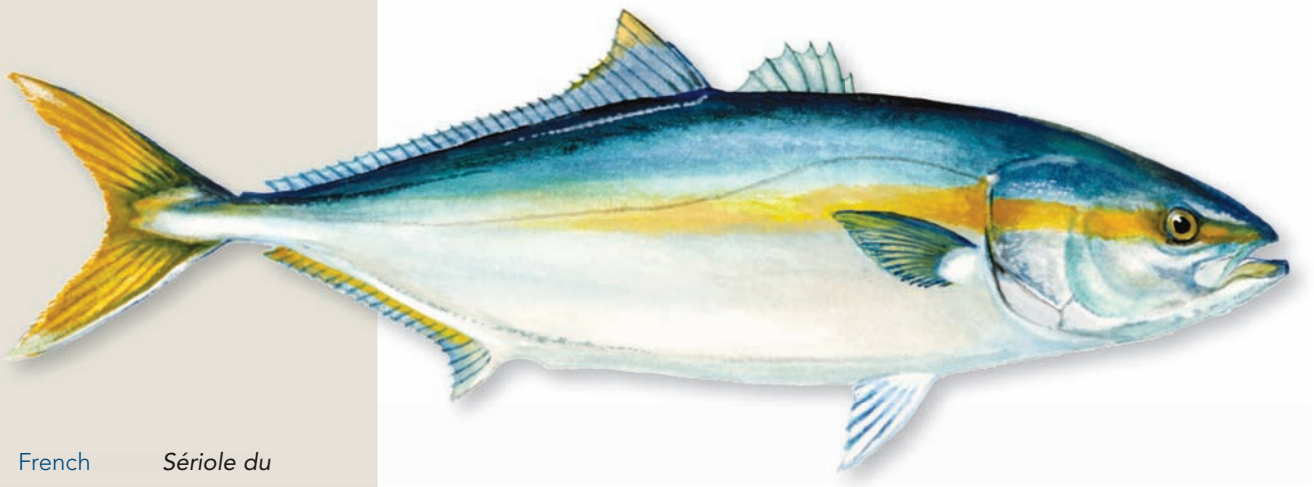
COOKING TIPS

Not as firm as monkfish nor as delicate as sole, the versatile wolffish holds together well and can be cooked successfully by many methods. It's excellent sautéed and sauced, or encrusted in herbed mustard and baked. The fish is a good addition to bouillabaisse, and with the skin on (to prevent sticking) it is even grill-friendly.

Substitutions Cod, Turbot, Haddock

GLOBAL SUPPLY

Yellowtail



French	*Sériole du Japon*
German	*Gelbschwanz*
Italian	*Ricciola*
Japanese	*Buri*
Spanish	*Serviola*

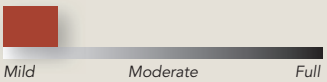
YOU SHOULD KNOW...

Yellowtail harvested off California (*S. lalandei*) are sometimes passed off as farmed hamachi. The wild variety is leaner and inferior for sashimi.

Scientific name: *Seriola quinqueradiata*
Market names: Yellowtail, amberjack
Common names: Hamachi, king amberjack, Japanese amberjack, buri, racing tuna

Yellowtail is a confusing name, as it can apply to flounder, tuna and sole. It's also the common name for several species of amberjack, sleek migratory tuna-like fish found off both U.S. coasts. The most valuable member of this family is the yellowtail farmed in Japan and featured in U.S. sushi bars under the name hamachi. The fish is prized for eating raw and commands a premium price in Japanese markets. Raised in cages in Japan's Inland Sea, hamachi are harvested at around 15 to 20 pounds. Upon harvesting, the fish are iced and handled with great care to prevent bruising of the flesh, which lowers its value as sashimi. A small amount of hamachi is harvested wild off the coast of central Japan. Another yellowtail species (*Seriola lalandei*) is harvested wild off southern California and Baja, California and farmed in Mexico and Australia. While amberjacks are subject to parasite infestation in the wild, this is not a problem with farmed hamachi.

FLAVOR



TEXTURE

PRODUCT PROFILE

Yellowtail meat is pink, though wild yellowtail can vary in color due to differing fat content among fish. Farmed yellowtail is consistently light colored because it is high in fat. Yellowtail fillets can have a dark muscle line along the edge.

Cooked meat is white and firm with a sweet, mild flavor. The high oil content gives the flesh a buttery texture.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed Seriola)

AMOUNT PER SERVING	
Calories	146
Fat Calories	47
Total Fat	5.2 g
Saturated Fat	1.3 g
Cholesterol	55 mg
Sodium	39 mg
Protein	23.1 g
Omega-3	N/A

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

COOKING TIPS

Hamachi is a versatile fish. Though mostly served raw, thinly sliced for sashimi, it is delicious lightly seared or marinated and then roasted, grilled or braised. It can also be simply seasoned with salt for grilling; salt and high heat bring out the sweet, delicate flavor.

Substitutions Albacore tuna, Swordfish

PRIMARY PRODUCT FORMS

Fresh

- H&G
- Fillets
- Loins

Frozen

- Fillets, skin-on, vac-packed

GLOBAL SUPPLY

Japan

Abalone

Haliotis rufescens

French	*Ormeau*
German	*Seeohr*
Italian	*Orecchia marina*
Japanese	*Awabi*
Spanish	*Oreja de mar*

Scientific name: *Haliotis* spp.
Market name: Abalone
Common names: Red abalone, black abalone, white abalone, pink abalone, green abalone, Australian abalone, giant abalone, blackfoot abalone, pinto abalone, blacklip abalone, greenlip abalone, Japanese abalone

YOU SHOULD KNOW...

Beware of circular, steaked cuttlefish mantles being offered as abalone. These are generally put through a meat tenderizer; look for needle marks as a clue to product substitution.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Wild abalone populations on the U.S. West Coast and worldwide have been decimated by predation, disease, loss of habitat and overfishing. However, farmed supply is alleviating the harvest shortfall; worldwide, more than 15 abalone species are commercially cultivated. The most popular and common abalone in the North American market is the red abalone (*Haliotis rufescens*), available as farmed product from California and both wild-harvested and farmed from Mexico. The only viable population of black abalone (*H. cracherodii*) in North America surrounds San Miguel Island off the southern California coast. The average size of wild-caught abalone is 12 inches, with meat weight averaging 1 pound per animal. Farmed abalone average about 4 inches in length. Grown either in onshore saltwater pens or in suspended cages, farmed abalone take three to four years to reach marketable size of four to six live animals per pound.

PRODUCT PROFILE

Abs consist mainly of a large, strong foot, which is the edible meat. When cooked, abalone is milky-moist, tender and mild — somewhat like lobster, though sweeter to the sophisticated palate. Taste-wise, abalone is also a distant cousin to calamari. Cultured abalone may be slightly more tender than wild-run.

Frozen meat should be firm, like an ivory-colored hockey puck. When thawed, it should have nearly no aroma. Cooked abalone appears in various shades of white. Live abalone should be active and stuck hard to the tank. The foot muscle should respond to touch. If it doesn't, or if it dents, the animal is near death.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	105
Fat Calories	7.2
Total Fat	0.8 g
Saturated Fat	0.1 g
Cholesterol	85 mg
Sodium	301 mg
Protein	17 g
Omega-3	0.1 g

Source: USDA

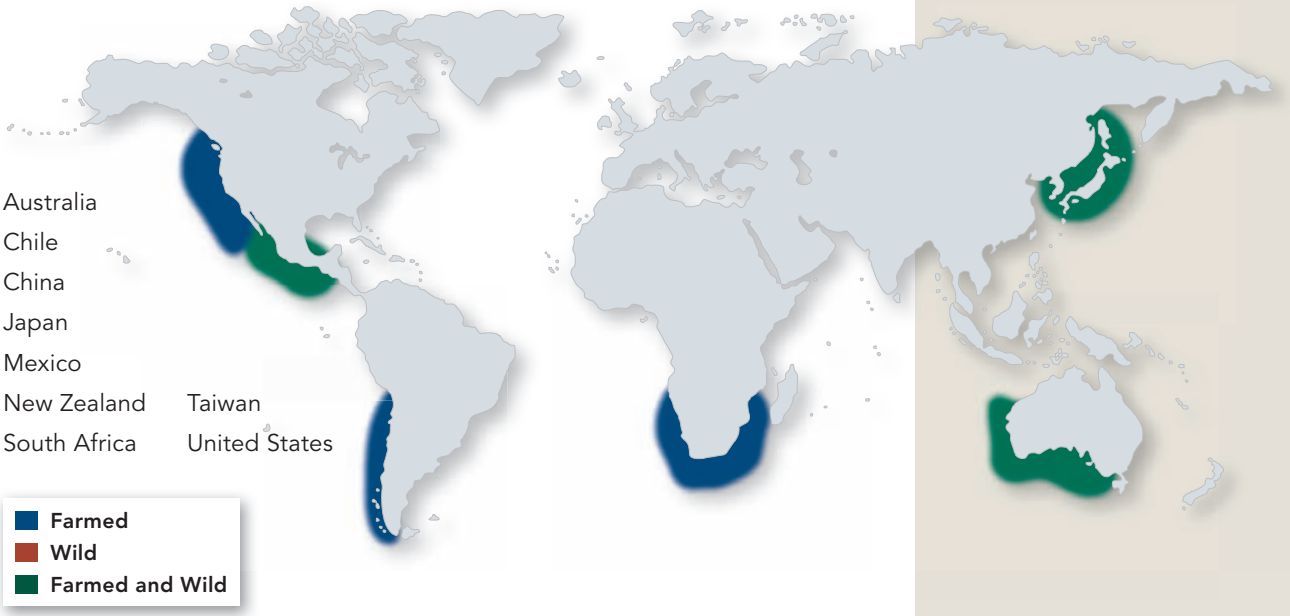
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Shuck live abalone with a wide spatula placed between meat and shell. Trim viscera and fringe. For steaks, make 3/8-inch slices parallel to the bottom of the foot and lightly pound with a wooden mallet until tender. Do not over-pound — you will shred the meat. Heat oil to near flash point in a shallow pan, then sauté less than 1 minute per side. Overcooking turns this delicacy to shoe leather. Save trimmings for chowder stock.

Substitutions Squid, Cuttlefish

GLOBAL SUPPLY



COOKING METHODS

- ☐ Bake
- ☐ Broil
- ☐ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh
- Live (in-shell)
- Shucked meats
- Steaks

Frozen
- Shucked meats
- Steaks

Value-added
- Canned
- Dried

Clam, geoduck

French	*Panope*
German	*Geoduck-Muschel*
Japanese	*Mirugai*
Spanish	*Almeja*

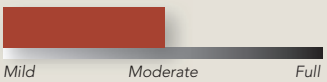
Scientific name: *Panopea abrupta*
Market name: Geoduck clam
Common names: Pacific geoduck, elephant trunk clam, king clam

YOU SHOULD KNOW...

While many customers prefer light-beige siphons, the taste and texture of the meat beneath the skin are the same, no matter what color the siphon's exterior.

The geoduck (pronounced "gooey duck") is the largest burrowing clam in the world and one of the longest-lived animals, sometimes living more than 100 years. Its name reportedly comes from the Nisqually Indian term "gwe-duk," which means "dig deep." The Chinese call it "elephant trunk clam," descriptive of the enormous siphon extending from the large, oval shell. The meaty siphon is the edible part of the bivalve, which can grow to a shell width of 7 inches and weighs an average of 2 1/4 pounds. The clam is prized in Hong Kong, China and Japan, where it is considered a rare taste treat, eaten cooked in a Chinese hot pot or raw, sashimi style. Geoducks are found in harvestable quantities only in Washington's Puget Sound and inland waters of British Columbia and Southeast Alaska. Washington accounts for about half the world supply. In the wild, geoducks are harvested individually by divers who use water jets to loosen the sand around the clams. A significant amount also is farmed in tidal flats around Puget Sound, where the clams start life in net-covered PVC tubes that are removed after the first year.

FLAVOR



TEXTURE

PRODUCT PROFILE

The geoduck siphon is covered with a tough skin ranging in color from light beige to brown. The flesh of a cleaned siphon is smooth and cream colored.

The geoduck siphon meat has a sweet, fresh sea flavor and crunchy texture.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	85
Fat Calories	18
Total Fat	2.0 g
Saturated Fat	N/A
Cholesterol	0 mg
Sodium	N/A
Protein	15.5 g
Omega-3	N/A

Source: Underwater Harvesters Assn.
Photo courtesy of Underwater Harvesters Assn.

COOKING METHODS

- ☐ Bake
- ■ Boil
- ■ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ☐ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

Siphon meat, vacuum packed

Frozen

Siphon meat, vacuum packed

Dried

Body meat

COOKING TIPS

To prepare for use, cut the siphon from the body meat and split it in half lengthwise. Cut each piece into paper-thin slices. Serve raw as sashimi or cook quickly in a stir fry or hot pot. Cooking toughens the meat rapidly. A quick blanching in boiling water or sauce gives best results. Dried body meat is sometimes used as an ingredient in Chinese soups.

Substitutions Abalone, Surf clam

GLOBAL SUPPLY

Clam, hardshell

French	*Praire*
German	*Venusmuschel*
Italian	*Vongola dura*
Japanese	*Nimaigai*
Spanish	*Verigueto*

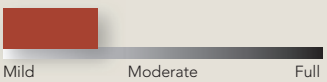
Scientific name: *Mercenaria mercenaria*
Market names: Clam, hardshell, quahog
Common names: Hardshell clam, quahog

YOU SHOULD KNOW...

Persons in high-risk health categories should not eat raw clams. Also, shellfish harvested from polluted waters or areas of naturally occurring "red tide" can cause serious infections or paralytic shellfish poisoning, respectively. Always check the source and certification of clams.

These clams are rarely sold by the name "hardshell" or "quahog," but instead are sold by names reflecting size (1 1/2 to 5 inches), from littlenecks to cherrystones, topnecks and chowders. On the West Coast, Manila clams and Washington steamer clams are sometimes called littlenecks, though they aren't in this hardshell family. Hardshells are the most valuable U.S. clam species, sold mostly live in bags. The clams are slow growers. Littlenecks — the most tender, most expensive and most sought-after — are 2 to 3 years old. Cherrystones are 5 to 6 years old. Large chowder clams can be 30 years old. Hardshells are found from the Canadian Maritimes to the Gulf of Mexico in bays, coves and salty estuaries. The major U.S. harvest is taken between Massachusetts and Florida. The clams are harvested by scissors-like tongs with wire-mesh bottoms and by hand rakes and hydraulic dredges. They are also farm-raised along the East Coast.

FLAVOR



TEXTURE

PRODUCT PROFILE

Hardshells are the connoisseur's choice for raw, halfshell clams. They are mild-flavored, sweet and briny. Cooked hardshells are soft, juicy and mild. Raw meat should be tender-crisp and plump, ranging in color from ivory to golden yellow, with some dark areas. Cooked meat is pale, pinkish-white.

Hardshells have an off-white, oval, symmetrical shell with a purple or violet border inside. Discard clams with open or broken shells. Unlike softshells, hardshell clams can close their shells completely and "live on their own juices" for a time, giving them a longer shelf life out of water than softshells.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (mixed species, raw)

AMOUNT PER SERVING	
Calories	74
Fat Calories	8
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	34 mg
Sodium	56 mg
Protein	12.7 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Virginia Marine Products Board

COOKING METHODS

- [x] Bake
- [ ] Broil
- [ ] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

Fresh
- Meats

Frozen
- IQF halfshell
- Whole
- Meats

Value-added
- Canned
- Stuffed
- Cakes

COOKING TIPS

Enjoy littlenecks raw on the halfshell, fried or steamed. In soup, add minced clams at the simmer stage, steep 5 minutes and serve. Cherrystones are sometimes eaten raw but more often are broiled, chopped for chowder or baked in dishes like clams casino. Large hardshells are stuffed or used in chowders, clam cakes and similar dishes. Whole, frozen clams must be served immediately upon thawing. If they are allowed to warm up, bacteria growth is rapid.

Substitutions Surf clams (chopped), Softshell clams

GLOBAL SUPPLY

Clam, softshell

French	*Mye*
German	*Sandklaffmuschel*
Italian	*Mia*
Japanese	*Nimaigai*
Spanish	*Almeja*

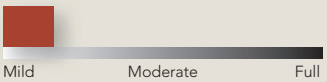
Scientific name: *Mya arenaria*
Market name: Softshell clam
Common names: Steamer, longneck, belly clam, Ipswich clam, maninose, squirt clam, fryer, gaper

YOU SHOULD KNOW...

Softshell clams that have wide-gaping shells and siphons that hang limply rather than withdrawing upon touch are dead and should be discarded.

Softshell is actually a misnomer for this clam, whose oval-shaped shell is actually thin and very brittle. Softshell clams average 1 1/2 to 3 inches in length. Their shell cannot close completely because of a protruding siphon. For this reason, softshell clams have a shorter shelf life than their closed, hardshell cousins. Though softshell clam beds are found all along the Atlantic Coast, the main commercial sources are Maine, Cape Cod and Maryland. They are harvested by raking or hoeing with short-handled churning hoes (shaped like inverted garden hoes). Since their shells gape, softshell clams can be gritty. To purge the stomach of sand and debris, soak clams in salted water (use 1/3 cup of salt per gallon of water) along with a cup of cornmeal. Like many bivalves, softshell clams are sensitive to bacterial pollution and outbreaks of "red tide." To safeguard public health, the harvest areas are closely monitored and closed when necessary.

FLAVOR



TEXTURE

PRODUCT PROFILE

The softshell clam's delicate meat is sweet and slightly salty. The large bellies are tender and soft. Meat color ranges from ivory to gold, with some dark areas.

The shell should be whole and clean, and the siphon firm and plump, not flaccid and dry. The siphon is covered with a dark membrane that is removed before the cooked clam is eaten.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (mixed species, raw)

AMOUNT PER SERVING	
Calories	74
Fat Calories	8
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	34 mg
Sodium	56 mg
Protein	12.7 g
Omega-3	0.2 g

Source: USDA

Photo courtesy of Ipswich Shellfish Co.

COOKING METHODS

- ☐ Bake
- ☐ Broil
- ■ Fry
- ☐ Grill
- ☐ Poach
- ☐ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Whole (steamed)
- Meats (whole)

Frozen

- Raw meats
- Steamed meats

Value-added

- Breaded, fried

COOKING TIPS

Softshells are not eaten raw. They are the clam of choice for steaming in the shell or frying in either crumbs or batter. To steam, place softshells in a large kettle with about 1 inch of water. Cover and bring the water to a boil; the clams will steam open in about 5 minutes. Cook just until the shells open; overcooking makes clams tough. Clams must never be kept in fresh water — it will kill them. Keep covered in the refrigerator.

Substitutions Hardshell clams, Surf clam strips

GLOBAL SUPPLY

Clam, surf

French	*Mactre d'Amérique*
German	*Riesen-Trogmuschel*
Italian	*Spisula*
Japanese	*Nimaigai*
Spanish	*Almeja*

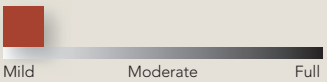
Scientific name: *Spisula solidissima*
Market names: Clam, surf clam
Common names: Surf clam, skimmer clam, hen clam, sea clam, giant clam, bar clam

YOU SHOULD KNOW...

The surf clam is almost always sold in processed form, which minimizes any health risks. Nonetheless, it's always a good idea to purchase even processed clams only from reputable dealers. Watch for clam-juice-flavored squid being passed off as "clam strips."

Surf clams are often the "fried clams" featured on menus across the country. This is the most important clam species, by volume, in the United States. Surf clams average 4 1/2 to 8 inches across. They're taken by hydraulic dredges from sand or gravel habitats in depths of 10 to 300 feet. The fast-growing clam matures in five to seven years and is found from Long Island to southern Virginia. More than half come from New Jersey, and New York is a significant contributor. Surf clams are too big and too coarse to be eaten whole like other clams. They are not sold live, either. Instead, they are processed onshore. Two-thirds of the surf clam's shucked weight is used. Half of that is the "tongue," which is used primarily for fried clam strips. The other half is the meat that runs around the shell, plus an adductor muscle that opens and closes the shell. It is ground or chopped and used for chowders, bisques and sauces.

FLAVOR



TEXTURE

PRODUCT PROFILE

Surf clams offer little waste: Shells serve as containers for stuffed dishes, and the twin adductor muscles (white cylinders attached to the shell) are delicious, as is the juice, or "nectar." These clams are less flavorful than hardshells. Cooked, the chewy white meat is mild and sweet.

Raw meat is whitish-orange. Cooked meat ranges in color from ivory to golden yellow, with some dark areas. Canned clams should be in clear to opaque liquid. Breading should be intact on breaded product.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (mixed species, raw)

AMOUNT PER SERVING	
Calories	74
Fat Calories	8
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	34 mg
Sodium	56 mg
Protein	12.7 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of Phillips Foods

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [x] Poach
- [ ] Sauté
- [ ] Smoke
- [ ] Steam

COOKING TIPS

This is not a clam to consider steaming or frying whole. It is generally shucked and minced for use in chowders, baked stuffed clams and the like. Minced or chopped meat is excellent in chowder, white sauces or with pasta dishes like clam linguine. The fleshy foot can be cut into strips for frying. The clam's juice is also great as an additive to soups, stews and seafood dishes.

Substitutions Hardshell clams, Softshell clams

PRIMARY PRODUCT FORMS

Fresh

- Chopped or minced meat

Frozen

- Chopped or minced meat
- Strips
- Steaks

Value-added

- Canned meat, chopped or minced
- Pre-fried strips
- Clam juice
- Chowders and bisques
- Cakes
- Stuffed

GLOBAL SUPPLY

Cockle

French	*Coque*
German	*Herzmuschel*
Italian	*Cuore*
Japanese	*Torigai, Hai-gai*
Spanish	*Berberecho*

Scientific names: *Cardium edule; Austrovenus stutchburyi* (formerly *Chione stutchburyi*); *Anadara* spp.

Market name: Cockle

Common names: Common cockle, European cockle; New Zealand cockle, New Zealand littleneck clam, Venus clam; blood cockle

YOU SHOULD KNOW...

Cockles could be one of several species from different global regions where harvesting and processing may be poorly regulated, if at all. Purchase only from reputable suppliers.

Although there are more than 200 species of bivalve mollusks worldwide described as cockles, only a half dozen are harvested on a significant scale as seafood. Once used widely as bait, cockles are now found at high-end restaurants. Because the cockle has only recently shifted from bait to plate status, the industry remains poorly regulated in many areas. Notable exceptions are New Zealand and Australia, where destructive mechanical harvesting is discouraged and handling and processing are well regulated. Most cockles sold in the United States are from New Zealand aquaculture operations for *Austrovenus strutchburyi*, while a smaller share is blood cockles (*Anadara granosa*), farmed in Thailand and Malaysia and harvested wild in Indonesia. South Australia is poised to enter the U.S. cockle market. Common cockles from the U.K. are sold in the United States primarily as specialty items (pickled or vacuum packed with vinegar). Although mangrove cockles (*Anadara grandis*) are an important artisanal fishery in many Pacific coastal communities from Mexico to Peru and the common cockle is an increasingly important U.K. fishery, the respective markets are primarily regional.

PRODUCT PROFILE

Cockles vary in size within and among species. Raw meat is gray and brown but turns a creamy color when cooked. Blood cockles are so named because the red meat produces a reddish-brown liquid when cooked.

Although cockle flavor varies, from slightly sweet (New Zealand cockles) to more briny (European cockle), the taste and texture are similar to that of clams.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, Anadara)

AMOUNT PER SERVING	
Calories	39
Fat Calories	4.5
Total Fat	0.5 g
Saturated Fat	0.2
Cholesterol	47 mg
Sodium	350 mg
Protein	8.5 g
Omega-3	N/A

Source: New Zealand Institute for Crop & Food Research
Photo by Lesley Kao

COOKING METHODS

- ☐ Bake
- ☐ Broil
- ☐ Fry
- ■ Grill
- ■ Poach
- ☐ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

Meats

Frozen

Meats

Value-added

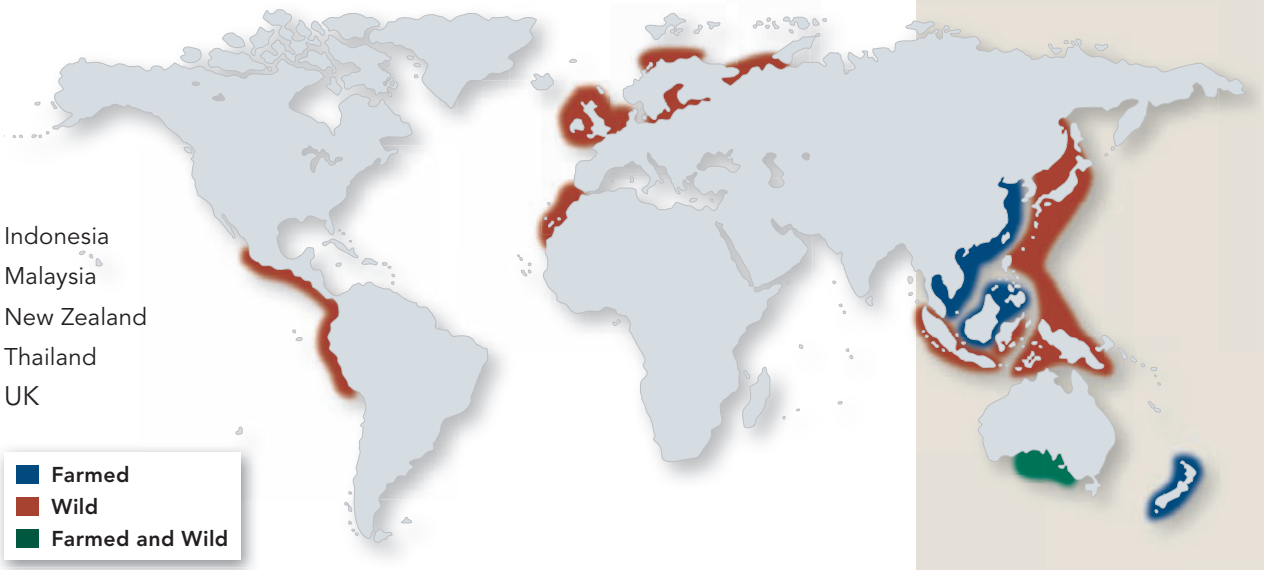
Canned
Pickled
Bottled in brine
Smoked

COOKING TIPS

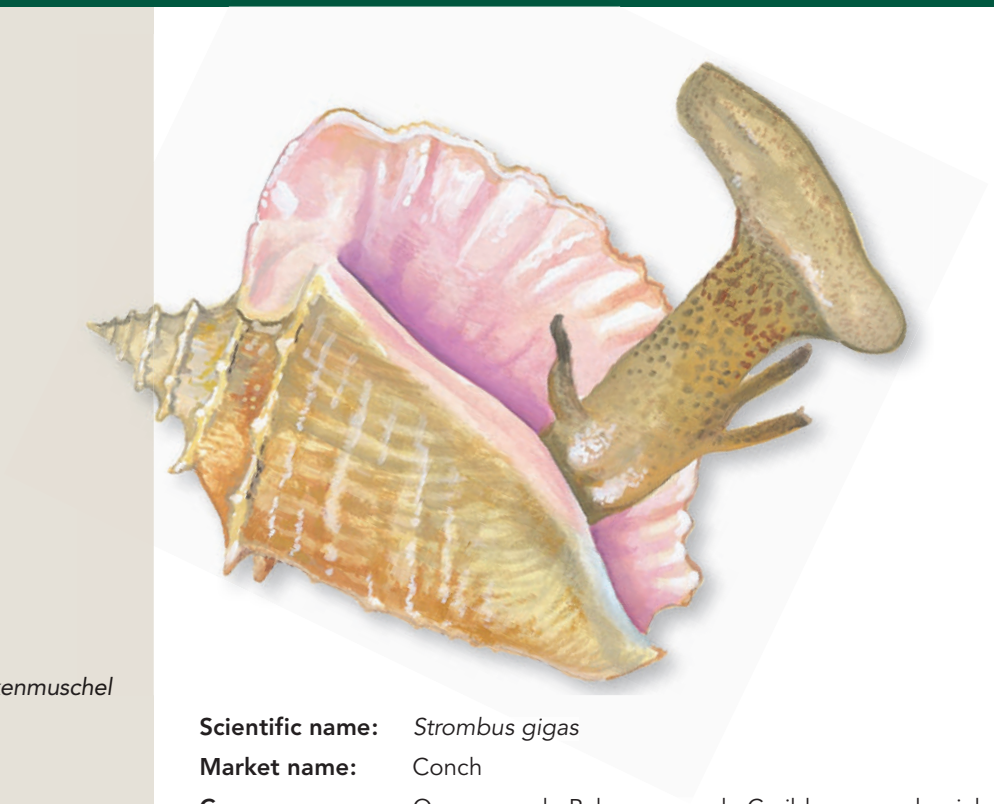
Live cockles are sufficiently cooked as soon as the shells open; overcooked, they shrivel quickly. In the U.K., steamed cockles served with vinegar — the legendary ware of Molly Malone — are a traditional treat. For an Aussie flare, try cockles barbecued in the shell. For a classic Asian treatment, stir-fry cockles with vegetables or serve in a ginger or chili sauce. In western continental Europe, where cockles are in high demand, cockle stews and pasta dishes or cockles roasted in the shell are relished.

Substitutions Hardshell clams, Softshell clams, Chopped surf clams

GLOBAL SUPPLY



Conch



French	*Lambis*
German	*Schneckenmuschel*
Italian	*Buccina*
Japanese	*Sazae*
Spanish	*Bocinas*

Scientific name: *Strombus gigas*
Market name: Conch
Common names: Queen conch, Bahamas conch, Caribbean conch, pink conch

YOU SHOULD KNOW...

With the whole foot, it's easy to tell conch and whelk apart: Whelk meat is about half the weight of conch and more yellow than that of the queen. In diced applications like salad, it's harder to tell the difference, so buy from reputable suppliers.

Don't confuse this large, warmwater gastropod with the East Coast whelk, also colloquially called conch. From the family Strombidae, the queen conch (pronounced "conk") is found primarily in the Caribbean, where it uses a muscular foot to drag itself along the ocean floor. Once abundant, conch now is endangered, and commercial harvesting is banned in the United States. Major suppliers are Jamaica; Turks and Caicos Islands, which also exports farmed conch; Honduras; and the Dominican Republic. There's an abundance of conch in the Bahamas, but it can be exported only as value-added products. Wild-caught conch is usually sold as frozen meat. Farming has made live and fresh product available. Whole, in-shell conchs range in size from 2 to 4 pounds. Both meat and shell are prized. When you buy conch meat, you get the foot. It is available at various degrees of cleaning (50, 85 and 100 percent cleaned of viscera), and prices vary accordingly.

FLAVOR

Mild — Moderate — Full

TEXTURE

0

Delicate — Medium — Firm

PRODUCT PROFILE

Conch has a sweet, slightly smoky flavor, similar to abalone or clam, and an almost crunchy texture. The meat, raw or cooked, ranges from snow-white to a pale, golden-orange, depending on size. The larger the animal, the darker the meat. Young "thin-lipped" conchs have more tender meat than larger, "thick-lipped" ones. Fresh, farmed conch is sweeter and more tender than frozen, wild conch, which can be chewy.

The foot has a protective covering, called the operculum, that needs to be removed before cooking.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	130
Fat Calories	11
Total Fat	1.2 g
Saturated Fat	0.4 g
Cholesterol	65 mg
Sodium	153 mg
Protein	26.3 g
Omega-3	0.1 g

Source: USDA
Photo courtesy of Debu-Hamu Designs

COOKING METHODS

- Bake
- Broil
- Fry
- Grill
- Poach
- Sauté
- Smoke
- Steam

PRIMARY PRODUCT FORMS

Live

Fresh

Meat

Frozen

Cooked meat

Value-added

Canned
Chowder
Fritters
Marinated meat

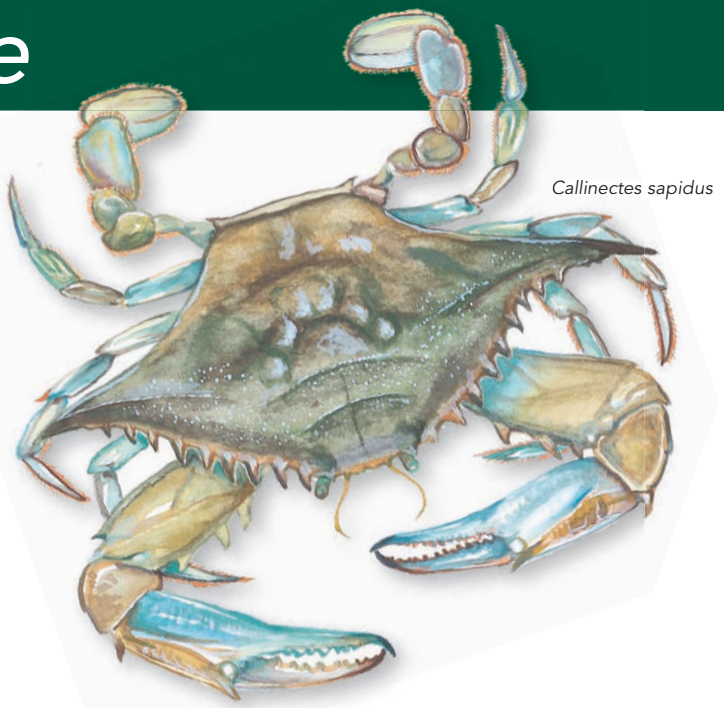
COOKING TIPS

Farmed conch cooks more quickly than wild; don't overcook, or meat will toughen. Before cooking, tenderize conch by pounding with a meat mallet, or slice thinly. Marinate sliced conch in lime juice for two hours for conch salad, or dice for chowder. For "cracked conch," dip tenderized steaks in egg wash, roll in flour and pan fry 5 to 6 minutes on each side.

Substitutions Abalone, Octopus, Squid

GLOBAL SUPPLY

Crab, blue



Callinectes sapidus

French	*Crabe bleu*
German	*Blaukrabbe*
Italian	*Granchio nuotatore*
Japanese	*Gazami*
Spanish	*Cangrejo azul*

YOU SHOULD KNOW...

Don't freeze pasteurized crab meat, as it ruins the flavor and texture. A bluish tint to pasteurized crab meat is not unusual, and it has no bearing on quality.

Scientific names: *Callinectes sapidus; Portunus pelagicus*
Market names: Blue crab; swimming crab
Common names: Blue crab, hardshell crab, softshell crab; blue swimming crab

Blue tinges on dark shells and blue patches on the legs give the crab its name. Males have blue claws; females' claws are orange-tipped. Blue crabs average 4 to 6 inches across. In the domestic fishery, male crabs ("Jimmies") and immature females ("Sallies") may be taken as hardshells when their carapace measures 5 inches. There are no size limits on mature female crabs ("sooks"). Blue crab is sold in both hardshell and softshell forms. Peeler crabs are those taken just before molting; softshell crabs are those harvested right afterward. The crabs are harvested with traps, nets and dredges. Blue crabs are found in brackish estuaries and bays from Cape Cod to the Gulf of Mexico. The largest concentration is in Chesapeake and Delaware bays off Maryland and Virginia. North Carolina and Louisiana have blue-crab fisheries as well. The same *sapidus* species is found in Central and South America, which supply crabmeat to the U.S. market. Blue swimming crab from the *Portunus* genus is imported from Southeast Asia, primarily as pasteurized meat.

PRODUCT PROFILE

Meat of the blue crab has a rich, sweet, succulent and buttery flavor. The body meat is delicately flavored, while claw meat is nutty. Softshells offer a crunchy texture, since they are eaten shell and all. Cooked shells of blue crabs turn orange-red. Body meat is white, tender and flaky. Claw meat has a brownish tint, which is natural.

Pasteurized meat is firmer and darker than fresh crab meat. Fresh blue-crab meat should have a mild aroma; pasteurized should have a slight, "heated" aroma.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, Calinectes)

AMOUNT PER SERVING	
Calories	87
Fat Calories	10
Total Fat	1.1 g
Saturated Fat	0.2 g
Cholesterol	78 mg
Sodium	293 mg
Protein	18.1 g
Omega-3	0.3 g

Source: USDA

Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Live crabs can be steamed or boiled and eaten straightaway or used in sauces or salads. Fried crab cakes, made with picked meat, bread crumbs, butter and seasoning, are a traditional favorite. Softshells are best sautéed, broiled or grilled at high heat, so shells become crisp. They're often fried and served in sandwiches.

Substitutions Other crab species, Lobster meat

GLOBAL SUPPLY

China
Indonesia
Mexico
Philippines
Thailand
United States
Venezuela
Vietnam

COOKING METHODS

- ☐ Bake
- ■ Boil
- ■ Broil
- ■ Fry
- ■ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live
- Hardshells
- Softshells

Fresh
- Whole, dressed hardshells
- Whole, dressed softshells
- Picked meat

Frozen
- Whole, dressed softshells
- Cooked meat
- Blocks
- Claws
- Cocktail claws

Value-added
- Cakes
- Stuffed
- Pasteurized meat

Crab, Dungeness

French	*Dormeur du Pacifique*
German	*Pazifischer Taschenkrebs*
Italian	*Granchio*
Japanese	*Danjinesukani*
Spanish	*Cangrejo Dungeness*

YOU SHOULD KNOW...

Beware of lightweight, softshelled Dungeness; they were harvested too early, before filling out their shells after a seasonal molt. These are known as "air crabs" because they contain little meat.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Cancer magister*
Market name: Dungeness crab
Common names: Dungeness, market crab, San Francisco crab

The Dungeness crab reportedly takes its name from a small fishing village on the Strait of Juan de Fuca in Washington state. It's also known as "San Francisco Crab," since the species has been harvested off that city since 1848. Dungeness are commonly sold live, fresh or frozen as whole "cooks" (industry shorthand for whole, cooked crab), sections, or clusters, single legs and picked meat. Dungeness are found from Santa Barbara, California, to the eastern Aleutian Islands off Alaska in the intertidal zone and to depths of over 1,000 feet. Typically, California, Oregon and Washington are the largest producers, followed by Alaska. Only males with a minimum shell size of 6 1/4 inches are harvested commercially; market size averages 1 1/2 to 3 pounds. Juvenile males and females are returned alive to the sea to ensure future harvests. The crabs are caught in circular steel traps, called pots, measuring 36 to 48 inches in diameter.

PRODUCT PROFILE

A world standard for premium crab, sweet, flavorful and semi-nutty, Dungeness has been likened to the shellfish version of an artichoke heart. Some compare the crab's meat to that of a Maine (American) lobster, but more tender. Leg meat is slightly firmer than body meat. Live Dungeness crabs are purplish-brown in color. When cooked, the shell turns bright orange. The cooked meat is opaque white.

Live crabs should be active in holding tanks. Shell color of whole cooks should be bright red; the back should not be cracked, and all legs should be attached.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	86
Fat Calories	8.11
Total Fat	0.9 g
Saturated Fat	0.1 g
Cholesterol	59 mg
Sodium	295 mg
Protein	17.4 g
Omega-3	0.3 g

Source: USDA

Photo courtesy of Alaska Seafood Marketing Institute

COOKING TIPS

To cook live 2- or 2 1/2-pound Dungeness crabs, boil for 18 to 20 minutes, then immerse in cold water to chill. Cool and crack and then serve with melted butter or a sauce. Cooked crabs can be eaten either hot or cold. The meat can be used in seafood stews or soups, sautés, salads and appetizers, in bisques, creamed dishes, salads and casseroles.

Substitutions Other crab species, Lobster meat

GLOBAL SUPPLY

COOKING METHODS

- ☐ Bake
- ■ Boil
- ☐ Fry
- ☐ Grill
- ☐ Poach
- ☐ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Whole cooks
- Meat

Frozen

- Whole cooks
- Cooked sections
- Cooked meat
- Blocks (meat)

Value-added

- Canned meat
- Pasteurized meat
- Snap-'n-eats

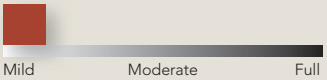
Crab, Jonah

French	*Crabe*
German	*Bogenkrabbe*
Italian	*Granchio*
Japanese	*Kani*
Spanish	*Cangrejo*

YOU SHOULD KNOW...

To test the quality of Jonah crab claws, break one open to see if the meat sticks to the shell. If it does, that indicates the claw wasn't cooked or frozen at peak freshness.

FLAVOR



TEXTURE

Scientific name: *Cancer borealis*
Market name: Jonah crab
Common names: Jonah, Atlantic Dungeness

Not long ago, Jonah crabs were considered little more than a nuisance by lobstermen off New England and the Canadian Maritimes, who routinely tossed the crustaceans back when they came up in lobster traps. But in the 1990s, as demand for an alternative to established and costly crab species grew, fishermen found they could make extra money selling Jonah crabs to interested processors. The crab is found increasingly on menus and in retail cases around the country. Canada, Maine and New Hampshire are important suppliers. Jonahs are landed year-round by inshore and offshore lobster boats. They range from Nova Scotia to northern Florida but are most abundant from Georges Bank to North Carolina. Jonahs are close relatives of rock crabs (*C. irroratus*), and the two are often regarded as the same species in the marketplace. However, with an average carapace width of 7 inches, Jonahs are larger and have bigger claws than rock crabs.

PRODUCT PROFILE

Jonah crabs are oval-shaped like Dungeness crabs, but with bigger claws. They have reddish shells and white undersides. Raw meat is translucent white; cooked meat is white with brownish-red highlights. It is flaky and sweet, often compared to Dungeness or stone crab, though it's darker and heavier in texture than Dungeness.

The biggest market for Jonah crab is processors and food manufacturers that "blend" the less expensive meat with Dungeness or blue-crab meat.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	107
Fat Calories	14.5
Total Fat	16 g
Saturated Fat	0 g
Cholesterol	71 mg
Sodium	286 mg
Protein	16 g
Omega-3	N/A

Source: Portland Shellfish
Photo courtesy of Slade Gorton/J. Nguyen

COOKING METHODS

- ☐ Bake
- ■ Boil
- ☐ Broil
- ☐ Fry
- ☐ Grill
- ☐ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Whole cooks
- Meat (also pasteurized)
- Cocktail claws
- Snap-'n-eat claws

Frozen

- Whole cooked
- Meat (also pasteurized)
- Whole claw and arm
- Cocktail claws
- Snap-'n-eat claws

COOKING TIPS

Jonah crab can be used in almost any recipe that calls for crab meat, including soups, stews, dips, stuffings and crab puffs and cakes. Large Jonahs make a fine cracked-crab entrée served with butter, lemon and herbs. To cook live crabs, place in boiling salted or seawater and cook for about 6 minutes per pound. When the crab has cooled, meat can be extracted from the legs and body.

Substitutions Dungeness crab, Stone crab

GLOBAL SUPPLY

Crab, king

French	*Crabe royal*
German	*Kurzschwanz-Krebs*
Italian	*Granchio*
Japanese	*Tarabagani*
Spanish	*Cangrejo*

YOU SHOULD KNOW...

It is essential to thaw king crab meat slowly — 24 hours in the refrigerator — or it will become watery and mushy. Remember that you're dealing with precooked product; don't overcook.

FLAVOR

Mild Moderate Full

TEXTURE

Delicate Medium Firm

Scientific name: *Paralithodes camtschaticus*
Market name: King crab
Common names: King crab, red king crab, Alaska king crab

The largest of the commercially harvested crabs, king crabs are characterized by spiny shells and long, spidery legs. Most crabs have 10 appendages, but king crabs have six walking legs, one large "killer" claw and one small "feeder" claw. The best meat is the merus, which comes from the upper section of the walking leg. It is marketed as "fancy." The crabs grow to 6 feet, from leg tip to leg tip, and from 4 to 10 pounds. Shell color varies according to harvest location. While red is the most common of the king crab species, there are also blue (*P. platypus*) and brown, or golden (*Lithodes aequspina*), king crabs. Red is most marketable, primarily because of size, followed by blue and then brown. Kings are found in shallow waters (60 to 100 fathoms) off the shores of Southeast Alaska and in the Bering Sea on flat, plain-like stretches of sea floor. King crabs often march in herds across vast expanses of these plains. They are caught in large, wire-mesh traps that measure 7 x 7 x 10 feet.

PRODUCT PROFILE

King crab is sweet, moist and rich. It's a bit firmer and coarser than Dungeness crab meat. The king's body meat is slightly flakier than the leg meat. The spiky shell of the cooked crab leg is a bright red. The meat is snow white with a scarlet membrane.

Almost all king crab sold in the U.S. market has been cooked and brine frozen. However, if processed correctly, the meat should not taste salty. Flavor is best just after thawing.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	84
Fat Calories	5.4
Total Fat	0.6 g
Saturated Fat	0.1 g
Cholesterol	42 mg
Sodium	836 mg
Protein	18.3 g
Omega-3	N/A

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING METHODS

- [x] Bake
- [x] Broil
- [ ] Fry
- [ ] Grill
- [ ] Poach
- [ ] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Cooked sections
- Cooked legs
- Cooked claws
- Picked meat

Frozen (most common)

- Cooked sections
- Cooked legs
- Cooked claws

COOKING TIPS

King crab meat, chunked, flaked or shredded, can be served hot or cold. For hot menu items, gentle heating is all that's required. Add to soups and stews during the last 5 minutes of cooking. Legs are often served in the shell with drawn butter. To steam, throw legs in a covered pot with an inch or so of water, bring to a boil and steam just until heated through, about 5 minutes.

Substitutions Other crab species, Lobster meat

GLOBAL SUPPLY

Crab, rock

French	*Crabe*
German	*Taschenkrebs*
Italian	*Granchio*
Japanese	*Kani*
Spanish	*Cangrejo*

YOU SHOULD KNOW...

Though rock crab is found from Labrador to Florida, "peekytoe" is the new star of the species. The marketing moniker applies to small rock crabs caught off New England and Canada and does not include Jonah crabs or rock crabs from other regions.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Scientific name: *Cancer irroratus*
Market name: Rock crab
Common names: Peekytoe crab, Atlantic rock crab, bay crab

Once considered "trap trash" (unwanted bycatch in the lobster fishery), the peekytoe crab has become coveted table treasure, thanks to a Maine seafood entrepreneur's clever marketing campaign and the species' delicate, sweet flavor. Known in Down East Maine dialect as "picket toe" or "picked toe," the crab was dubbed "peekytoe" by Rod Mitchell of Browne Trading Co. in Portland, Maine. Novelty and quality combined to make the new product a smash hit. Because peekytoe crabs cannot be shipped live, the meat must be meticulously hand picked. As a result, the crab is the basis for one of the few "cottage" seafood industries left in the United States. Only a handful of processors in Maine and Canada specialize in peekytoe, which only adds to the product's allure. Although technically a rock crab species found from Labrador to Florida, "peekytoes" originally referred only to rock crabs caught in Down East Maine's Penobscot Bay. However, as peekytoe fever caught on with chefs and diners, sourcing expanded to include rock crabs from Nova Scotia to Rhode Island. There is no dedicated peekytoe fishery; the crabs are still a lobster-fishery bycatch, with peak availability in summer.

PRODUCT PROFILE

Peekytoe is a smaller crab than Jonah, with claws too small to sell whole. Unlike the Jonah's white meat, cooked peekytoe meat is pink or cream with reddish-brown highlights.

The crab has a delicate, sweet-salty flavor and is lighter in texture than Jonah crab.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	118
Fat Calories	16
Total Fat	1.8 g
Saturated Fat	0 g
Cholesterol	70.6 mg
Sodium	812 mg
Protein	23.5 g
Omega-3	N/A

Source: Browne Trading Co.
Photo courtesy of Browne Trading Co.

COOKING METHODS

- ☐ Bake
- ■ Boil
- ☐ Broil
- ☐ Grill
- ■ Poach
- ☐ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

Cooked, picked meat

Frozen

Cooked, picked meat

COOKING TIPS

Peekytoe lends itself to gourmet salads and appetizers and simple treatments. In the crab's home state of Maine, the meat is most often mixed with mayonnaise and served in crab rolls or prepared as crab cakes. Peekytoe meat can be applied to all recipes calling for crabmeat, including chowders, casseroles, stir fries and dips. As the meat comes cooked, heat through only as necessary for hot recipes to preserve the delicate flavor and texture.

Substitutions Jonah crab, Dungeness crab, Stone crab

GLOBAL SUPPLY

Crab, snow

French	*Crabe*
German	*Eismeerkrabbe*
Italian	*Granchio*
Japanese	*Zuwaigani*
Spanish	*Cangrejo*

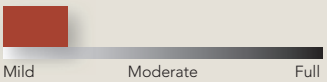
Scientific name: *Chionoecetes* spp.
Market name: Snow crab
Common names: Snow crab, Alaska snow crab, spider crab, tanner crab, queen crab (Canada)

YOU SHOULD KNOW...

As snow crab ages, it can become "dirty," with black patches, barnacles and mottling on its shell. This doesn't affect the quality, but "dirty-shell" crabs can be cheaper and meatier, since they haven't molted.

The North American snow crab fishery targets three species: *Chionoecetes opilio, C. bairdi* and *C. tanneri*. Technically, opilios are snow crabs, and bairdis are tanners. Alaska's opilio fishery occurs in the Bering Sea and is much larger than its bairdi fishery. Bairdi are taken in the Bering Sea and Gulf of Alaska. The most important commercially is opilio, which is also the only species caught in both the Atlantic and Pacific. It has supported major fisheries in both Alaska and the Canadian Maritimes (where it's sometimes called queen crab). Snow crabs are taken in traps, from sandy bottoms in depths of 30 to 1,500 feet. They are smaller and less red than king crabs and, instead of the king's three sets of walking legs, these crabs have four sets, plus a pair of claws. Bairdi are the largest snow crab, averaging 5 pounds and measuring 3 feet from tip to tip. Opilio average just over 1 pound; tanners are slightly larger, with longer, skinnier legs.

FLAVOR



TEXTURE

PRODUCT PROFILE

Snow crab meat is sweet and delicate, with a more fibrous texture than king crab. Texture ranges from the tender, longitudinal fibers of shoulder meat to firmer fibers of claw meat. Cooked shell is red, though not as red as king crab, running to brownish at the shoulder. The meat ranges from snow white to reddish.

Like king crab, snow crab is marketed already cooked.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	90
Fat Calories	10.8
Total Fat	1.2 g
Saturated Fat	0.1 g
Cholesterol	55 mg
Sodium	539 mg
Protein	18.5 g
Omega-3	0.4 g

Source: USDA
Photo courtesy of Alaska Seafood Marketing Institute

COOKING TIPS

Because the snow crab sold in the U.S. market is cooked before processing, all you need to do is thaw (slowly — one to two days in the fridge) and reheat. Do more than warm it up, and you run the risk of making it dry and tough. Snow crab meat can be used in chowders, omelets, crepes, casseroles and quiches. Split legs are often served cold as appetizers or are broiled and served warm with drawn butter. Whole legs and clusters can be steamed.

Substitutions Other crab species, Lobster meat

COOKING METHODS

- ■ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ☐ Poach
- ☐ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live (limited)

Fresh

- Picked meat

Frozen (most common)

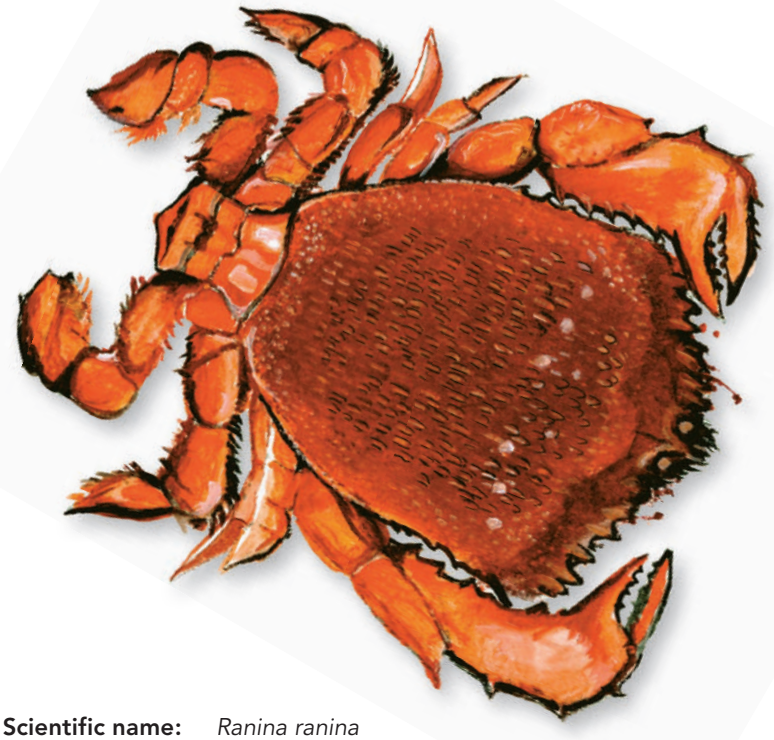
- Cooked sections
- Cooked legs
- Cooked legs and claws
- Cooked meat
- Blocks (meat)
- Cooked claws

Value-added

- Canned meat
- Snap-'n-eats
- Splits
- Cakes

GLOBAL SUPPLY

Crab, spanner



French	*Crabe*
German	*Krabbe*
Italian	*Granchio*
Japanese	*Kani*
Spanish	*Cangrejo*

Scientific name: *Ranina ranina*
Market name: Spanner crab
Common names: Spanner crab, frog crab, red frog crab, Kona crab

YOU SHOULD KNOW...

Given its hard shell and low meat yield, spanner crab is best used for picked meat rather than whole presentation.

Spanner crab is a newcomer to the U.S. market, exported from northeastern Australia for the white-tablecloth-dining market. Because of its limited and recent distribution in this country, the crab does not yet appear on the USDA Fish List. Though Australian supplies dominate the domestic market, Hawaii also has a commercial fishery for the species, whose range extends through the Indo-Pacific region in sandy coastal waters. The odd-looking animal bears names reflecting its frog-like shape and large front pincers, which resemble spanners — or wrenches. Spanner crab is a good choice for buyers concerned about sustainability, as the selective harvesting method eliminates bycatch. In Australia, the crabs are trapped in baited net bags known as dillies. In Hawaii, where the species is called Kona crab or "Päpa'i kualoa," fishermen employ flat, circular nets baited and laid along the seafloor. Australian spanners are available year-round except for a month beginning at the end of November, when they spawn. Most of the spanner crabs harvested Down Under are exported as live product. The remainder is cooked and sold locally.

PRODUCT PROFILE

The spanner crab's shell color ranges from burnt orange to brick red even when uncooked and turns a brighter orange after cooking. The raw flesh is translucent and becomes bright white when cooked.

The meat is soft and moist, with a slightly sweet and delicate flavor.

FLAVOR

TEXTURE

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
*Calories	62.4
Fat Calories	4.5
Total Fat	0.5 g
Saturated Fat	0.14 g
Cholesterol	29 mg
*Sodium	373 mg
*Protein	15.1 g
Omega-3	0.84 g

Source: FDRC, Australia; *CEAS Crabpak
Photo courtesy of CEAS Crabpak, Australia

COOKING METHODS

- ☐ Bake
- ■ Boil
- ☐ Broil
- ☐ Grill
- ■ Poach
- ☐ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

Hand-picked meat

COOKING TIPS

The most common way to cook whole spanner crab is boiling or steaming for 12 or 13 minutes. Afterward, immerse immediately in cold water to stop further cooking. The picked meat can be used in stir-fries, salads, sandwiches, or as an addition to pasta dishes and risottos. It also works well as a filling for ravioli and Asian-style dumplings or won tons.

Substitutions Blue swimming crab, Crayfish, Spiny lobster

GLOBAL SUPPLY

Crab, stone

French	*Crabe*
German	*Steinkrabbe*
Italian	*Granchio*
Japanese	*Kani*
Spanish	*Cangrejo*

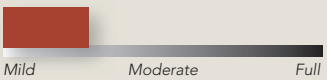
Scientific name: *Menippe* spp.
Market name: Stone crab
Common names: Florida stone crab, Gulf stone crab

YOU SHOULD KNOW...

Stone crab claws must be cooked immediately after harvest to prevent the meat from sticking to the inside of the shell.

Florida's regulatory agencies recognize three species as true stone crabs: the Florida variety (*Menippe mercenaria*), the Gulf crab (*M. adina*) and a hybrid resulting from interbreeding of the two primary species. Stone crabs are found along the Atlantic and Gulf coasts from Texas to the Carolinas, but Florida accounts for almost all the commercial harvest. The fishery is unique in that Florida law forbids landing whole stone crabs; only the crab's large front claws are kept. Fishermen are allowed to take claws with a 2 3/4-inch propodus, which is the pincher section of the claw, measured from the "elbow" joint to the tip of the pincher. After removing the claws, fishermen must return the stone crab safely to the water. If the claws are removed correctly, a thin membrane forms over the wound and prevents bleeding. A legal-sized crab can regenerate a harvestable claw in three annual molts. The crabs are captured commercially with traps, which are rebaited every other day.

FLAVOR



TEXTURE

PRODUCT PROFILE

Stone-crab claws are smooth and rounded. The shells turn bright orange when cooked; the tips remain black. Raw meat is grayish; cooked is white. The meat resembles lobster in appearance.

The claw meat is sweet, mild and firm, like a cross between crab and lobster. The shell is "harder than a landlord's heart," noted one Florida gourmand.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	71
Fat Calories	0
Total Fat	0 g
Saturated Fat	0 g
Cholesterol	53 mg
Sodium	353 mg
Protein	17.6 g
Omega-3	N/A

Source and photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- ☐ Bake
- ☐ Boil
- ☐ Fry
- ☐ Grill
- ☐ Poach
- ☐ Sauté
- ☐ Smoke
- ☐ Steam

COOKING TIPS

Boiling is the best way to prepare stone crab. The rich meat needs only simple treatment. Crack the hard shells with a mallet or nutcracker and serve cold with hot melted butter and a squeeze of lemon. Or serve with lime wedges and mayonnaise or a lime-and-dill vinaigrette. Thaw frozen claws in the refrigerator for 12 to 18 hours. Quality is lost when claws are thawed under cold running water. Never thaw at room temperature.

Substitutions Lobster, Other crab species

PRIMARY PRODUCT FORMS

Fresh

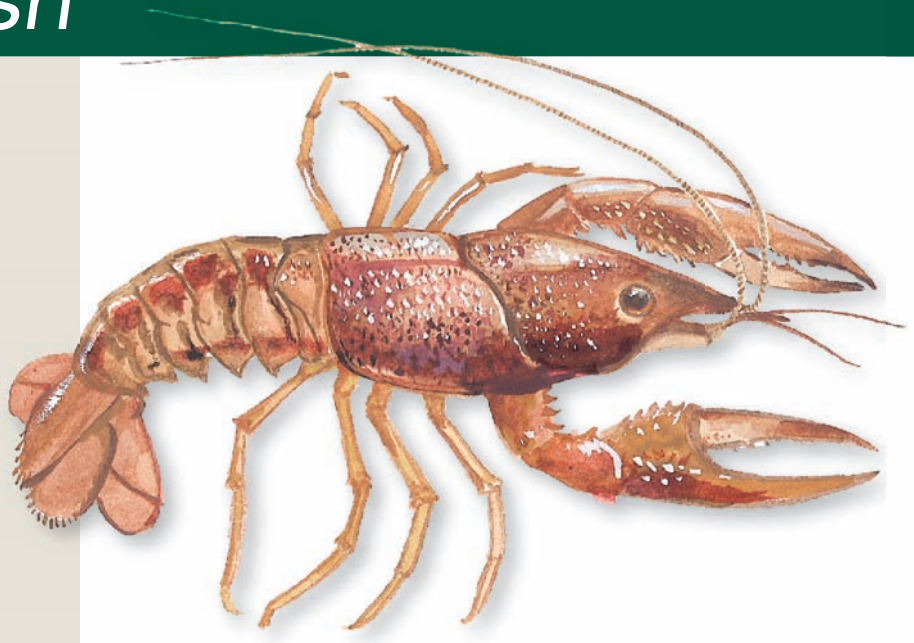
Cooked whole claws

Frozen

Cooked whole claws

GLOBAL SUPPLY

Crawfish



French	*Ecrevisse*
German	*Flusskrebs*
Japanese	*Zarigani*
Spanish	*Cangrejo de rio*

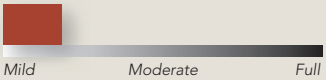
YOU SHOULD KNOW...

Labels should distinguish between farm-raised and wild-run crawfish and include the state (even the river) of origin. Fresh, whole, cooked, ready-to-serve crawfish is quite perishable and should be used quickly.

Scientific names: *Procambarus clarkii, P. zonangulus*
Market names: Crawfish, crayfish
Common names: Crawdad, red swamp crayfish, mudbug, crayfish

Crawfish are freshwater crustaceans that resemble miniature lobsters, ranging in size from 3 1/2 to 7 inches. Over 400 species are found worldwide, 250 of which are in North America, living in rivers, lakes, swamps, canals, wetlands and irrigation ditches. The most important farmed U.S. species is red swamp crawfish *(Procambarus clarkii)*, found in southern Louisiana. Second is the white-river crawfish *(P. acutus)* from northern Louisiana. Approximately 90 percent of the U.S. farmed and wild crawfish production comes from Louisiana, where crawfish are trapped in the wild and farmed as a rotating crop with rice. Crawfish are also farmed and harvested wild in other southern states and in the Pacific Northwest. In China, crawfish are cultivated in ponds with other fish. In California, fishermen trap coolwater crawfish in rivers that feed the Sacramento Delta. Fishermen in the Midwest trap the species in lakes. Limited amounts are farmed in Europe.

FLAVOR



TEXTURE

PRODUCT PROFILE

Crawfish meat is sweet like lobster meat but more tender and not quite as rich. Alive, red swamp crawfish are red to nearly black; white-river crawfish are light to dark brown. All crawfish cook up brilliant red. Raw meat is grayish in color. Cooked meat should be a clean white. Softshell crawfish are those that have just molted.

Make sure live product is indeed alive before cooking. As with lobster, the meat deteriorates rapidly after death. Crawfish fat, sometimes called head fat, is yellow and contains most of the flavor. It can be purchased as a separate product. Removing it from crawfish meat improves the shelf life.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	77
Fat Calories	8
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	114 mg
Sodium	58 mg
Protein	15.9 g
Omega-3	0.2 g

Source: USDA

COOKING TIPS

For a classic preparation, boil in spicy Cajun or Creole seasonings or use Scandinavian dill seasonings. Jambalaya, bisque and etouffeé are traditional presentations. Use only live, clean crawfish. Cook immediately by dropping into boiling water. Keep them cold until ready to cook. Live crawfish should splay their claws when grabbed. If an animal is limp or its tail doesn't curl when cooked, toss it.

Substitutions Shrimp, Lobster

GLOBAL SUPPLY

China
Japan
Norway
Sweden
United States

COOKING METHODS

- ☐ Bake
- ■ Boil
- ☐ Broil
- ☐ Fry
- ☐ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live
- Purged
- Unpurged

Fresh
- Whole, cooked
- Softshell
- Tail meat (with or without "fat")

Frozen
- Whole, cooked
- Shell-on tails
- Tail meat (cooked/uncooked, with or without "fat")

Value-added
- Marinated, spiced whole-shell
- Marinated, spiced tail meat
- Frozen entrées

Cuttlefish

French	*Sèche*
German	*Tintenfisch*
Italian	*Seppia*
Japanese	*Ko-ika*
Spanish	*Jibia*

YOU SHOULD KNOW...

Light color and elasticity are signs the cuttlefish was processed quickly and properly.

Scientific name: *Sepia* spp.
Market name: Cuttlefish
Common name: Common cuttlefish

A 10-armed mollusk related to octopus and squid, the cuttlefish sports a flat, oblong body and narrow fins. The body is larger and fatter than a squid, making it meatier, and the ink sac is larger than that of the squid or octopus, with darker ink. One pair of arms, which retracts into pouches, is longer than the rest and is used to capture prey. Cuttlefish species range in size from 2 inches to 2 feet. When alarmed, a cuttlefish darts violently backward by expelling a water jet from its mantle cavity. Its ink was formerly used to make a brown pigment called sepia. Cuttlefish is not found in North America except as an export from Europe, where it is caught by trawling, trapping and netting and is as common as squid. It is harvested from coastal waters of the Indo-Pacific, and a larger species of cuttlefish that is marketed as sepia is found in the eastern Atlantic, from France to west Africa. Others come from Korea, Japan and Australia.

FLAVOR

TEXTURE

PRODUCT PROFILE

Fresh cuttlefish are light brown, with zebra-like stripes across their mantels. Cooked meat is pure white. Cleaned cuttlefish are bright white, with their tentacles usually intact. Uncleaned, they have a thin, purplish membrane on their bodies, which should be removed.

Cuttlefish meat is sweet tasting. The texture is similar to that of a fish fillet and quite tender if cooked properly.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	79
Fat Calories	6
Total Fat	0.7 g
Saturated Fat	0.1 g
Cholesterol	112 mg
Sodium	372 mg
Protein	16.2 g
Omega-3	0.1 g

Source: USDA

COOKING TIPS

Treat cuttlefish as you would squid; steam, stew in wine, stir-fry, sauté or batter and fry it. You can also serve it as sushi. For a European treat, marinate cuttlefish strips in olive oil, garlic and vinegar, then grill briefly. Or, since much of what's offered as squid ink is actually cuttlefish ink, try it in "black pasta," with garlic, shallots, onion, rosemary and thyme. Do not overcook, or the meat will be rubbery and chewy.

Substitutions Octopus, Squid

GLOBAL SUPPLY

COOKING METHODS

- ☐ Bake
- ☐ Broil
- ■ Fry
- ■ Grill
- ■ Poach
- ■ Sauté
- ☐ Smoke
- ■ Steam

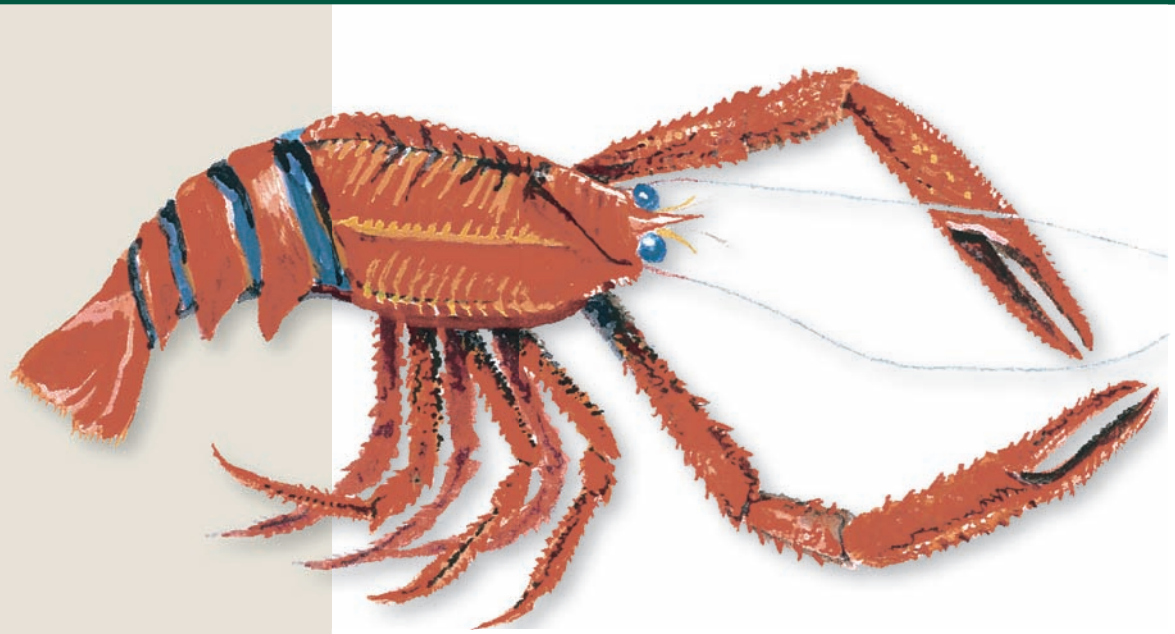
PRIMARY PRODUCT FORMS

Fresh
- Whole
- Cleaned
- Fillets (mantle portions, split lengthwise)

Frozen
- Whole
- Cleaned
- Fillets (mantle portions, split lengthwise)
- Strips

Value-added
- Breaded or unbreaded strips
- Dried
- Ink

Langostino



French *Galathée rouge*
German *Langostino*
Spanish *Langostillo*

YOU SHOULD KNOW...

Because of its name, the langostino is often confused with the unrelated lobsterette or langoustine of Europe, which is also called Norway lobster and Dublin Bay prawn.

Scientific names: *Pleuroncodes monodon; P. planipes*
Market name: Langostino
Common names: Langostino, langostino colorado; squat lobster, langostino chileno

There are several species of langostino, but the one most commonly marketed is *Pleuroncodes monodon*, a small, lobster-like crustacean found in the cold, deep waters off the coast of Chile, where it is known as langostino colorado. A related langostino, *P. planipes*, also called tuna crab, ranges from Baja, California to Peru. A fishery off the coast of El Salvador provides langostino lobster for the U.S. market. The langostino is actually a member of the crab family Galatheidae. Ranging from 4 to 5 inches in length, the crustacean looks like a short, crinkled crawfish but brandishes a pair of front pincers longer than its body. However, it is seldom seen whole in the marketplace, since it is most often sold in the United States as frozen, cooked tail meat, either in the shell or peeled and deveined. Langostinos are caught by trawlers and landed alive for processing. After a near-collapse of the fishery in the early 1980s, the Chilean government now strictly controls the harvest to ensure maximum sustainable yield.

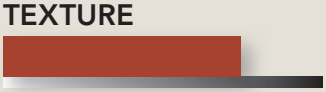
PRODUCT PROFILE

Langostino looks like cooked shrimp meat but has a sweet, delicate flavor more like lobster or crab. The texture resembles shrimp more than lobster tail meat.

The edible morsel of meat in the langostino is found in its inch-long tail. Meat sizes range from 100- to 200-count per pound.

FLAVOR

TEXTURE



NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	71
Fat Calories	0
Total Fat	0 g
Saturated Fat	0 g
Cholesterol	125 mg
Sodium	360 mg
Protein	15 g
Omega-3	N/A

Source: Trident Seafoods
Photo courtesy of Trident Seafoods

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

COOKING TIPS

The pre-cooked langostino meats offer convenience and no waste. They are an ideal size for salads, stuffings, soups, seafood sauces or pizza and can be sautéed or stir-fried to serve over pasta. Langostino tail meat can be used in recipes calling for cooked crab, lobster or shrimp.

Substitutions Lobster, Crab, Shrimp

PRIMARY PRODUCT FORMS

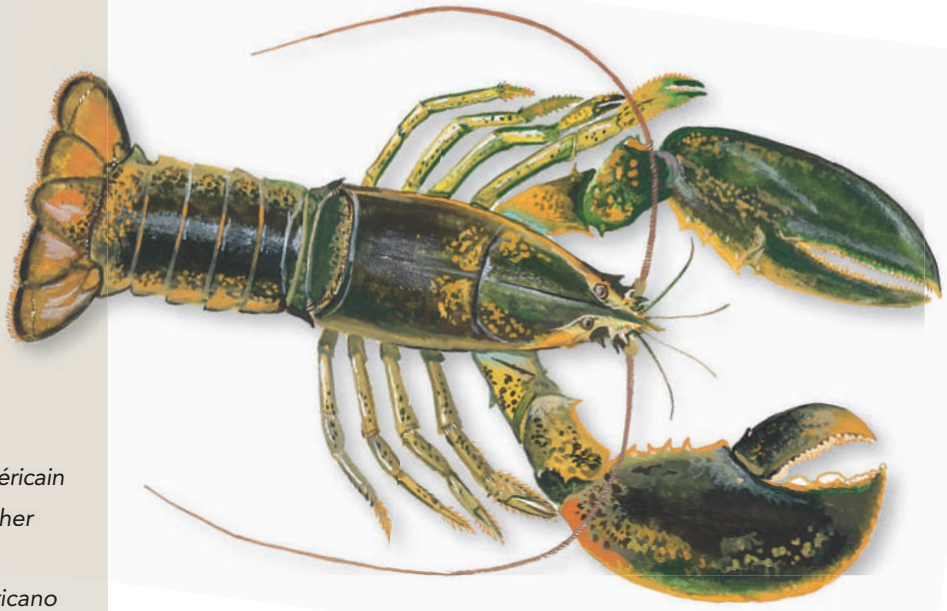
Frozen

IQF cooked tails

Pasteurized, cooked tail bars (small "blocks")

GLOBAL SUPPLY

Lobster, American



French	*Homard Américain*
German	*Amerikanischer Hummer*
Italian	*Astice Americano*
Japanese	*Ise ebi*
Spanish	*Bogavante Americano*

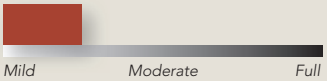
Scientific name: *Homarus americanus*
Market name: Lobster
Common names: American, Maine or Canadian lobster

YOU SHOULD KNOW...

Live lobsters will keep for 24 hours in a refrigerator or cooler (33° to 40°F), if kept moist with seaweed, wet paper towels or wet newspaper. Do not immerse in freshwater, as they can suffocate.

American lobsters have two powerful claws — a crusher and a ripper — which should be kept banded to prevent injury to other lobsters or the cook. The meatiest part of the animal is the tail, though claws, knuckles, body and small walking legs offer meat, too. American lobsters are found in the North Atlantic from Labrador to North Carolina. Major producers are Atlantic Canada, Maine and Massachusetts, in that order. The lobsters are harvested from depths of 15 to 1,000 feet in rectangular, wire-mesh traps. Market sizes range from "chickens" (1 to 1 1/8 pound) to jumbos (over 3 1/2 pounds). A pound of meat can be extracted from four to six lobsters weighing 1 to 1 1/4 pounds. A lobster sheds its shell annually, revealing a soft new one underneath. Though the newly molted lobster is much larger, its meat is watery and flaccid. New-shells offer lower meat yields than hardshells (30 to 45 percent vs. 55 percent).

FLAVOR



TEXTURE

PRODUCT PROFILE

Lobster meat is mild and sweet in flavor. The texture is firm and somewhat fibrous; tail meat is firmer than that in the claws. Live lobsters range in color from brownish rust to bright blue to greenish brown. All lobster shells turn bright red when cooked. The meat is white with red tinges. Live lobsters should be active, and their tails should curl, not dangle, beneath them. Cook weakened lobsters immediately; discard dead ones.

Consumers are advised not to eat the tomalley, the light-green substance found in the lobster. This is the liver and pancreas, which accumulates contaminants from the creature's environment.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	90
Fat Calories	8.1
Total Fat	0.9 g
Saturated Fat	0.2 g
Cholesterol	95 mg
Sodium	296 mg
Protein	19 g
Omega-3	0 g

Source: USDA

COOKING TIPS

Opinions vary on how best to cook lobster. Some say steaming is best because it is gentle heat, which will not toughen the meat. Others say boiling seals the flavor into the lobster. Baking is another option, but the lobster should be quickly boiled or steamed beforehand. A cooking rule of thumb for 1 1/4-pound lobsters is 12 to 15 minutes; for larger lobsters, about 17 minutes.

Substitutions Spiny lobster, Crawfish, Crab

GLOBAL SUPPLY

Canada
United States

Farmed
Wild
Farmed and Wild

COOKING METHODS

- [x] Bake
- [x] Boil
- [ ] Broil
- [ ] Fry
- [x] Grill
- [ ] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Cooked claw, knuckle meat
- Picked meat

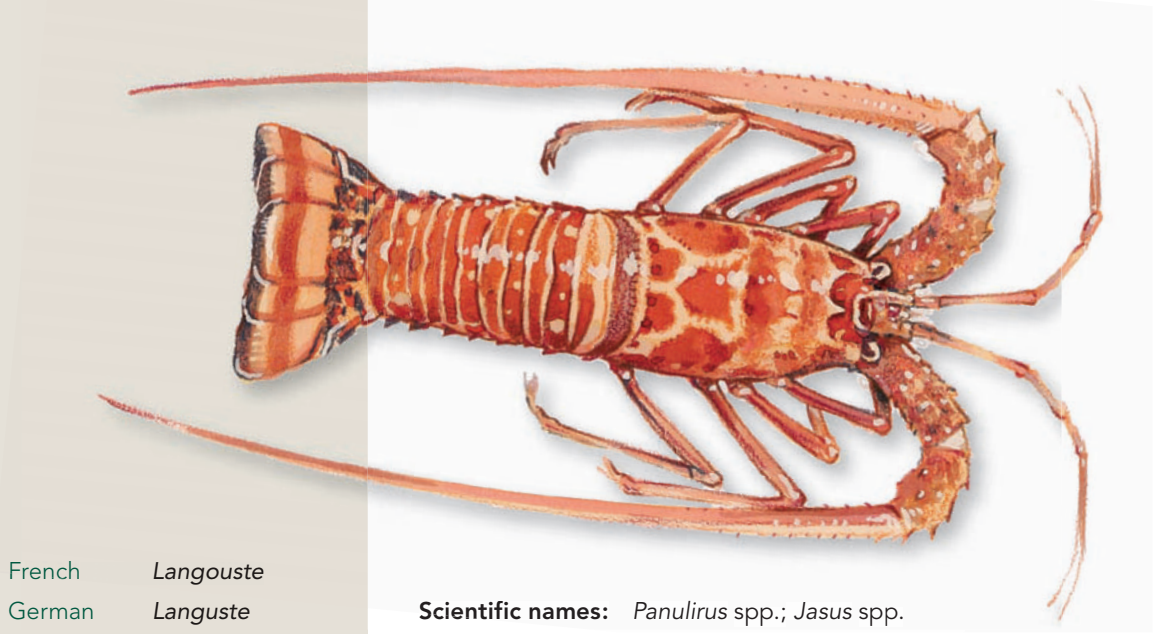
Frozen

- Whole-cooked
- Cooked claw, knuckle meat
- Tails
- Tail medallions
- Claws

Value-added

- Canned meat
- Stuffed tails
- Frozen entrées

Lobster, spiny



French	*Langouste*
German	*Languste*
Italian	*Aragosta*
Japanese	*Iseebi*
Spanish	*Langosta*

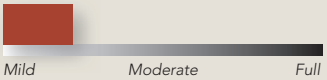
Scientific names: *Panulirus* spp.; *Jasus* spp.
Market name: Rock lobster
Common names: Spiny lobster, red spiny lobster, warmwater lobster, coldwater lobster

YOU SHOULD KNOW...

If cooked tail meat is gray, the lobster was probably dead when it was processed. Also check that the sand vein has been flushed; no black spots should appear. If they do, the tail may have a strong ammonia taste.

Spiny lobsters lack the large front claws of the American lobster and are prized instead for their tail meat, which accounts for 33 percent of the body weight. Some 30 species of spiny lobster are found in tropical and subtropical waters around the world. They are marketed in the United States as either warmwater or coldwater tails, depending upon where they were captured. Brazil and the Caribbean are the main sources for warmwater tails; Australia, New Zealand and South Africa supply coldwater tails. *Panulirus* and *Jasus* species are the most valuable lobsters commercially. The Caribbean lobster, *P. argus,* is the main warmwater tail on the U.S. market, and *P. cygnus* from Australia is the main coldwater species. Rock lobsters average under 5 pounds; translated into tails, the range is 5 to 22 ounces, with most product under 8 ounces. The lobsters are captured mainly in baited traps but are also caught in trawls or by divers.

FLAVOR



TEXTURE

PRODUCT PROFILE

Coldwater tails tend to be more tender and succulent than warmwater, and they shrink less during cooking. Tail meat is firm, mild and sweet. Raw tail meat is nearly translucent, with a pink, cream or whitish-gray tint, depending on the animal's diet. Cooked tail meat should be firm and snowy white with red tinges but no dark spots.

Watch for overglazing. It's limited mainly to warmwater tails, as coldwater producers usually sell their product dry, wrapped with plastic wrap. Pacific Ocean spiny lobsters sport greenish/orange shells; those from the Atlantic are reddish brown. The shell is rougher on a coldwater lobster.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	112
Fat Calories	14
Total Fat	1.5 g
Saturated Fat	0.2 g
Cholesterol	70 mg
Sodium	177 mg
Protein	20.6 g
Omega-3	0.4 g

Source: USDA

Photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- [x] Bake
- [x] Boil
- [x] Broil
- [ ] Fry
- [x] Grill
- [ ] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

Frozen

- Whole (blanched or fully cooked)
- Split
- Tails
- Meat

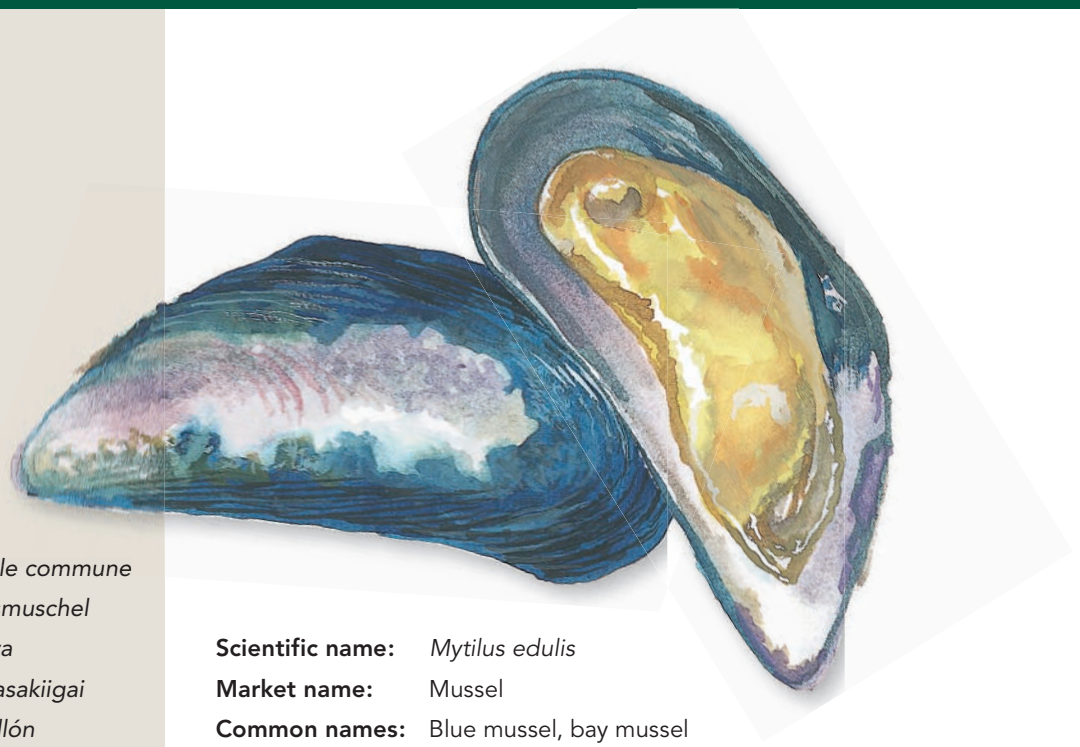
COOKING TIPS

Broil tails and serve with melted butter and lemon wedges, or combine with a steak for Surf and Turf. Baked is good, too, but add some water or wine to the pan to prevent drying. If you want to remove the meat from the tails, make sure you split them ahead of time. Use a pair of scissors to cut lengthwise along the underside of the shell; otherwise the meat will be very difficult to remove.

Substitutions American lobster

GLOBAL SUPPLY

Mussel, blue



French	*Moule commune*
German	*Miesmuschel*
Italian	*Cozza*
Japanese	*Murasakiigai*
Spanish	*Mejillón*

Scientific name: *Mytilus edulis*
Market name: Mussel
Common names: Blue mussel, bay mussel

YOU SHOULD KNOW...

Bags or containers of mussels should display the license number of the shipper, as required by the National Shellfish Sanitation Program. Buy only from certified growers who harvest in certified areas.

At one time held in low esteem, the blue mussel has become an aquaculture and culinary success story. While they grow wild, mussels are also farmed in Europe and on both coasts of North America. Maine is the largest U.S. producer, but the domestic market also draws farmed mussels from Canada's Prince Edward Island and lesser amounts from China and South America. Washington is the Pacific Coast's major supplier of farmed blue mussels. Wild mussels are found in the intertidal zone on rocks and pilings and in beds to depths of 30 feet. Mussels are farmed on ropes or in mesh tubes suspended from rafts. Off-bottom techniques reign, owing to quick growth, low predation, reduced sand accumulation, better taste and higher meat yield. The cultivated mussels are harvested at a shell size of 2 to 3 inches. They cost more than wild but are usually worth the extra price. To distinguish from wild mussels, check the shell. Farmed have thin, dark shells; wild have thicker, silvery shells.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

Blue mussels have a distinctive rich, sweet taste, like a blend of oysters and clams. Mussels should look and smell fresh and have tightly closed shells. Mussel meats, which range from white to orange, are plump and tender, but less soft than clams. Color doesn't indicate quality. Females tend to be orange when ripe (they're fine to eat and, unlike oysters, don't taste oily when about to spawn).

If a mussel's shell gapes, try to pinch it shut. If the mussel is alive, it will respond by shutting its shell tightly. If it doesn't, discard the mussel, along with any that have broken shells.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	86
Fat Calories	20
Total Fat	2.2 g
Saturated Fat	0.4 g
Cholesterol	28 mg
Sodium	286 mg
Protein	11.9 g
Omega-3	0.5 g

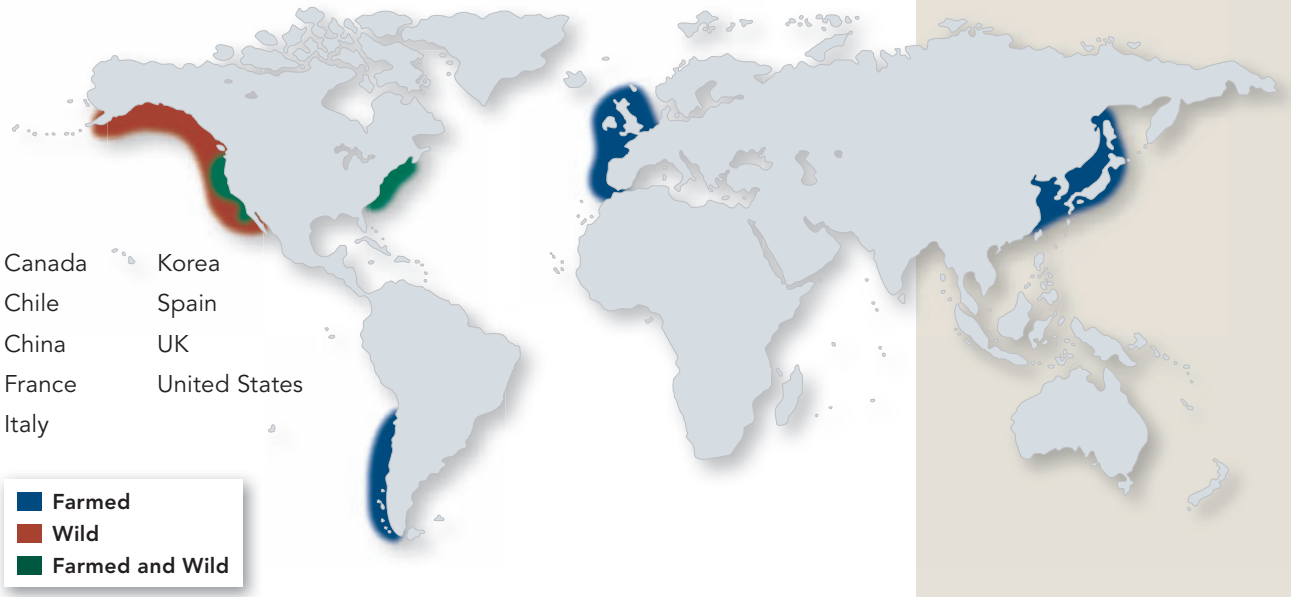
Source: USDA

COOKING TIPS

Mussels have beards, or byssus threads, which they use to anchor themselves to a growing medium. The beard should be removed just prior to cooking. Mussels are best steamed in water, wine or cream broth seasoned with herbs and garlic. Try cold, lightly marinated mussel meats served in a sauce of mayonnaise, mustard and garlic, or use cooked mussel meats in pasta salads or as an appetizer. Mussels are also great in seafood soups or stews, like cioppino or bouillabaisse.

Substitutions Greenshell mussels, Hardshell clams, Softshell clams

GLOBAL SUPPLY



COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Meats

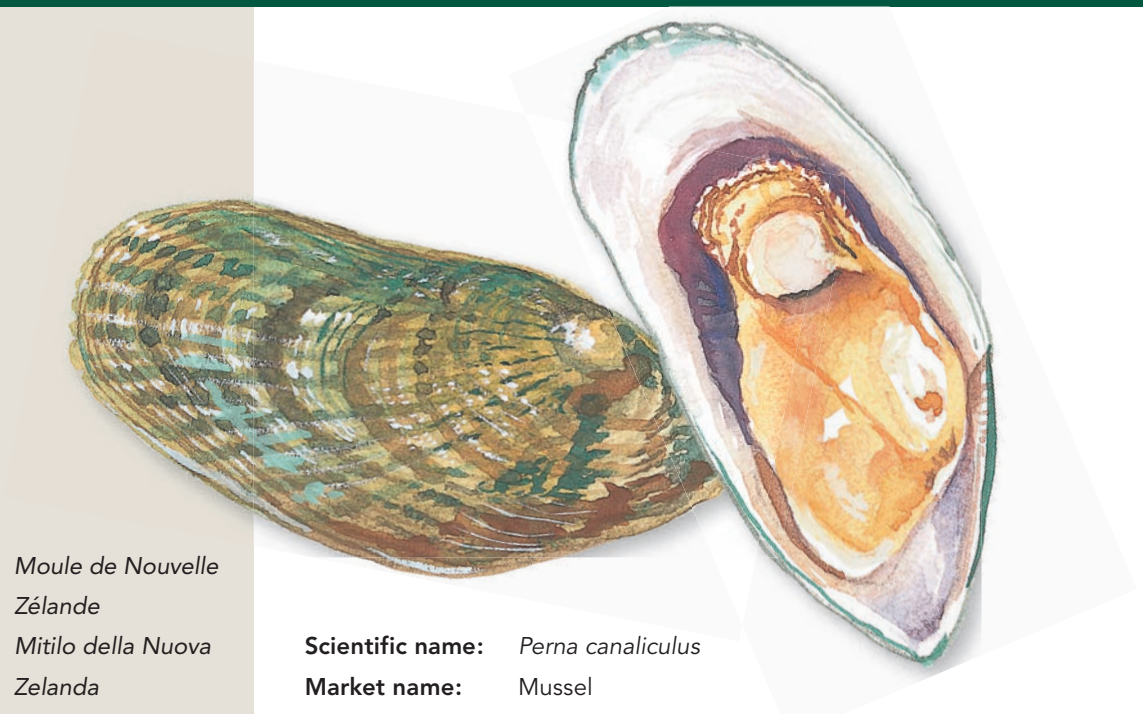
Frozen

- Whole-shell, steamed
- Halfshell, steamed
- Meats, steamed
- Blocks (meats)

Value-added

- Marinated meats
- Smoked meats
- Pickled meats
- Frozen, breaded or battered meats
- Canned meats, stews

Mussel, green



French *Moule de Nouvelle Zélande*
Italian *Mitilo della Nuova Zelanda*
Spanish *Mejillón de Nueva Zelanda*

Scientific name: *Perna canaliculus*
Market name: Mussel
Common names: New Zealand green mussel, greenshell, greenlipped mussel

YOU SHOULD KNOW...

Frozen, whole or halfshell mussels may be stored for 24 months. Once thawed, they should be consumed in two to three days.

The green mussel is native to New Zealand, which has exported it to the United States since 1979. Greenshells are farmed mussels, cultivated on ropes, rafts or longlines. Growing standards, including water quality and production levels, are tightly regulated by the New Zealand government, so quality of the product is consistently high. Green mussels boast an attractive, elongated shell that is brownish-green on one end but changes to green at its broad lip, interrupted by dark-brown striations. The mussels grow to over 8 inches, though market size is usually 3 1/2 to 4 inches. Upon harvesting, live mussels are typically cooled to about 36°F and held at that temperature throughout the shipping process. Prior to shipping, their shells are cleaned and, in high-end operations, they are hand-graded and packed within hours of harvest. Look for the grower's name on the mussels — a dependable sign of safety and high quality.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

Green mussels are sweet, tender, delicate, plump and juicy. Meat color varies from apricot (female) to cream (male). The color has no effect on flavor. Greenshells are most commonly available individually quick frozen in the whole or half shell to lock in flavor.

Because they are grown on ropes suspended above the seabed, they rarely contain grit or sand. Unlike the blue mussel, the greenshell mussel's shell is slightly open in its natural state, which New Zealanders refer to as "smiling." The shell closes tightly when the mussel is subjected to stress, freshwater or rough handling.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	85
Fat Calories	19
Total Fat	2.1 g
Saturated Fat	N/A
Cholesterol	27 mg
Sodium	429 mg
Protein	12 g
Omega-3	0.5 g

Source: New Zealand Mussel Industry Council
Photo courtesy of Empress International © 1997

COOKING TIPS

Since frozen halfshells are already partially cooked, you can add a topping of your choice before "final-touch" broiling or baking. Cooking from frozen at high heat gives the best results. Live green mussels require only a little steam or heat to open 1/4 inch. After that, add a vinaigrette dressing and enjoy. Also excellent heated in Italian sauces and served with pasta. Meats are good whole or chopped in casseroles, chowders and salads, or minced in terrines, patés and quiches.

Substitutions Blue mussels, Hardshell clams, Softshell clams

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- ■ Broil
- ☐ Fry
- ☐ Grill
- ☐ Poach
- ■ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh
- Shucked meats
- Frozen
- Whole
- Halfshell
- Meats
- Blocks

Frozen (cooked or partially cooked)
- Whole
- Halfshell
- Meats

Value-added
- Marinated meats
- Smoked meats
- Stuffed
- Pickled

Octopus

French	*Poulpe*
German	*Krake*
Italian	*Polpo*
Japanese	*Ma-dako tako*
Spanish	*Pulpo*

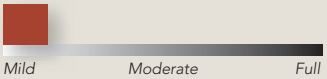
Scientific name: *Octopus* spp.
Market name: Octopus
Common name: Devilfish

YOU SHOULD KNOW...

Normal visual standards for evaluating quality don't apply to octopus, since outward appearance can be deceiving. The main criteria is smell.

Related to cuttlefish and squid, octopus are cephalopods, or "head-footed," referring to the eight "legs" that sprout from their head. They also have a parrot-like beak for crushing prey such as abalone, crab and lobster. There are more than 140 species in temperate and tropical waters throughout the world, ranging in size from a few ounces to over 100 pounds. Octopus are taken from tide pools and at depths of several hundred feet, where they inhabit small, dark crevices in the ocean floor. Primary octopus suppliers are the Philippines, Thailand and Korea. Hawaii and California are domestic sources. Octopus often are caught in unbaited "habitat traps," into which they willingly crawl. Octopus are amazingly dexterous at hunting and fleeing. Most biologists consider them the smartest of all invertebrates, on par in intelligence with the house cat. When frightened, they emit an inky black substance.

FLAVOR



TEXTURE

PRODUCT PROFILE

Octopus meat is uniquely textured — smooth, but with a firm-to-chewy "bite." The animal's diet of high-quality shellfish gives it a mild, sweet flavor. The edible skin is purplish-black and covers milky white meat. Cooked meat is translucent beige, sometimes with hints of deep pink.

Size depends on species and region of harvest. Octopus from Thailand are small, averaging 14 to 21 ounces; those from the Philippines are larger, graded in sizes of 1 to 2, 2 to 4, and 4 to 6 pounds. Korean octopus is even larger.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	82
Fat Calories	9
Total Fat	1 g
Saturated Fat	0.23 g
Cholesterol	48 mg
Sodium	230 mg
Protein	14.9 g
Omega-3	0.16 g

Source: USDA

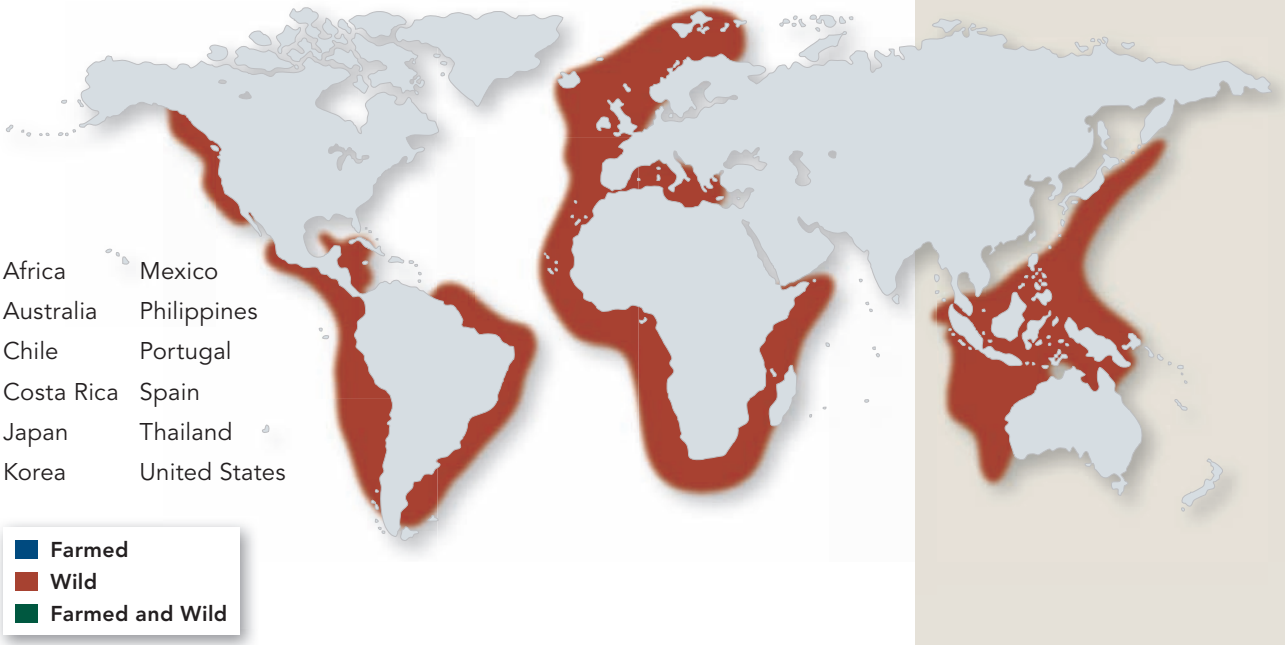
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING TIPS

Unlike squid, octopus must be cooked a long time to become tender. Common preparations call for simmering the meat in tomato-based stews or slow, long cooking in a wine sauce. Before using in a recipe, the meat is boiled for 30 minutes to an hour to tenderize. To grill pre-cooked octopus, brush large-cut pieces with a mixture of olive oil, lemon juice, crushed garlic and oregano. Grill quickly over a hot charcoal fire, until slightly crisp.

Substitutions Squid, Cuttlefish, Conch

GLOBAL SUPPLY



Africa
Australia
Chile
Costa Rica
Japan
Korea
Mexico
Philippines
Portugal
Spain
Thailand
United States

COOKING METHODS

- ☐ Bake
- ■ Broil
- ☐ Fry
- ■ Grill
- ☐ Poach
- ☐ Sauté
- ■ Smoke
- ☐ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Whole
- Cleaned
- Meat

Frozen

- Cleaned
- Blocks (whole; meat and tentacles)

Value-added

- Dried
- Smoked

Oyster, Eastern

French	*Huître Américaine*
German	*Amerikanische Auster*
Italian	*Ostrica della Virginia*
Japanese	*Kaki*
Spanish	*Ostra Virginiana*

Scientific name: *Crassostrea virginica*
Market name: Oyster
Common names: Atlantic or Eastern oyster, cove oyster, American oyster

YOU SHOULD KNOW...

Never buy oysters that do not bear the harvester's name, address, date and certification number, and keep the tag for at least 90 days. This should be done routinely.

Unlike most of the world, where the Pacific oyster has taken over the oyster grounds, America still has its native oyster, the same one that fed the Pilgrims at Plymouth Rock. Today, two-thirds of the national oyster harvest is Eastern oysters. While Pacific oysters are mostly cultivated, Eastern oysters are harvested mainly from wild beds in the Gulf of Mexico. They're also farmed in Long Island Sound and parts of Atlantic Canada. Because of the different conditions associated with each grow-out region — nutrients in the water, salinity levels, temperature, etc. — oysters vary in taste from one area to the next and often bear the name of the region where they were grown as a means of distinguishing their individual flavor attributes. The renowned Blue Point, for example, hails from Long Island Sound. There are also the Chincoteagues, Apalachicolas and Cape Cods, each with its own character. Oysters are harvested from brackish, shallow water with dredges or tongs. Market size is usually 3 to 4 inches.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

The Eastern oyster is known for its distinctive, salty flavor and meaty texture. Oyster meats, which are somewhat fatty, should be smooth with adequate liquor (store cup-side down to retain the liquor). Eastern oysters have a moderately deep, elongated, gray-white to gray-brown, rough, spoon-shaped shell with rose-colored streaks. Inside is a light-colored fringe (the gill) and creamy to light-brown meat. Cooked meat turns ivory.

To test for live oysters, tap the shell; it should close. A sulfur odor indicates a dead oyster. The liquid in which fresh, shucked oysters are packed should be clear.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, wild Eastern)

AMOUNT PER SERVING	
Calories	137
Fat Calories	44.1
Total Fat	4.9 g
Saturated Fat	1.5 g
Cholesterol	105 mg
Sodium	422 mg
Protein	14.1 g
Omega-3	1.2 g

Source: USDA
Photo courtesy of Maryland Dept. of Agriculture

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [x] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

Fresh
- Halfshell
- Shucked meats

Frozen
- Whole
- Halfshell
- Shucked meats

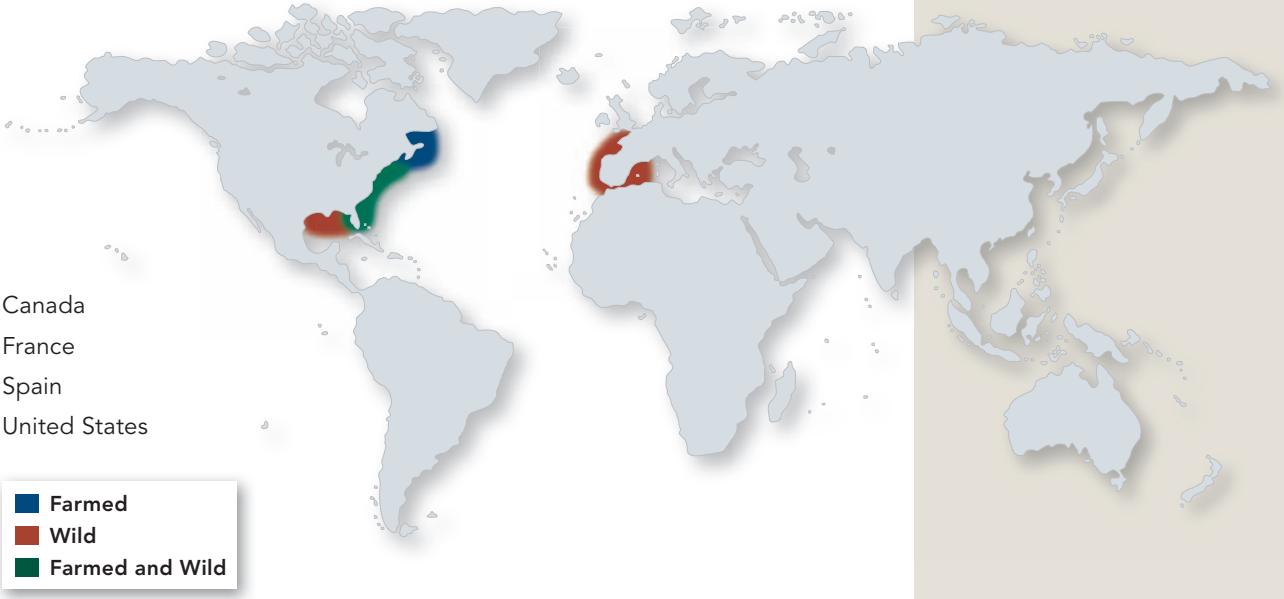
Value-added
- Smoked
- Canned
- Breaded
- Fritters

COOKING TIPS

Oysters are tender creatures. They should never be heated too quickly or too long. As soon as the mantle starts to curl, they're done. For a classic presentation, try Oysters Rockefeller — broiled in their shells on pans of salt, topped with bacon, breadcrumbs, butter and scallions. Though oysters are often served on the halfshell, people in high-risk categories should avoid raw shellfish.

Substitutions Pacific oysters, European oysters

GLOBAL SUPPLY



Oyster, European

French	*Huître plate*
German	*Auster*
Italian	*Ostrica*
Japanese	*Kaki*
Spanish	*Ostra plana*

YOU SHOULD KNOW...

Flat oysters are primarily grown subtidally, so they don't develop strong adductor muscles to keep themselves closed while in storage. To retain liquor, store cup side down, and take care not to break the fragile shell.

Scientific name: *Ostrea edulis*
Market name: Oyster
Common names: European oyster, edible oyster, flat oyster, Belon oyster

European oysters, first farmed by the Romans, were so prized that they were transported across the English Channel in snow-packed barrels. Today, they are farmed off New England, California and Washington state and, to a lesser degree, in France, England and Norway. On the U.S. East Coast, the oysters are also taken from the wild. Some market names reflect European origins, like Whistable (England), Lymfjord (Denmark) or Zelande (Netherlands). European oysters are grown on the sea floor or in suspended systems employing trays, mesh bags or "Chinese hats" (Frisbee-shaped discs). These so-called "flat" oysters have a shallow shell and are harvested at 3 to 4 inches long. The species is primarily offered live for the halfshell trade. They are often incorrectly called "Belons." In France, that name is protected by law; only oysters grown in the Belon River estuary of Brittany, in northern France, have a right to the name.

FLAVOR

TEXTURE

PRODUCT PROFILE

Traditionally, flat oysters are reputed to have a finer flavor than all other oyster species. Their taste is fairly pronounced, with distinct salty highlights and a sweet to flinty overtone. There's a slight metallic aftertaste, almost like sucking on a penny — nothing a sip of white wine won't fix.

European oysters are more rounded than Atlantic or Pacific oysters. Shells are flat, with little cup. Color varies from white to brown, with the inside a creamy off-white. The meat is a creamy to light brown, matching the shell lining. Cooked meat turns ivory.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (cooked)

AMOUNT PER SERVING	
Calories	117
Fat Calories	37
Total Fat	4.6 g
Saturated Fat	1.2 g
Cholesterol	93 mg
Sodium	350 mg
Protein	11.7 g
Omega-3	N/A

Source: FDA
Photo courtesy of American Mussel Harvesters

COOKING TIPS

European oysters are especially relished raw on the halfshell with a squirt of lemon and a drop of Tabasco sauce. However, consuming raw shellfish of any type is risky for people suffering from impaired immune systems. When cooking European oysters, the simpler the method, the better. Their full flavor also makes them a good addition to soups and stews.

Substitutions Atlantic oysters, Pacific oysters

COOKING METHODS

- ■ Bake
- □ Broil
- ■ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Fresh

- Halfshell
- Shucked, raw meats

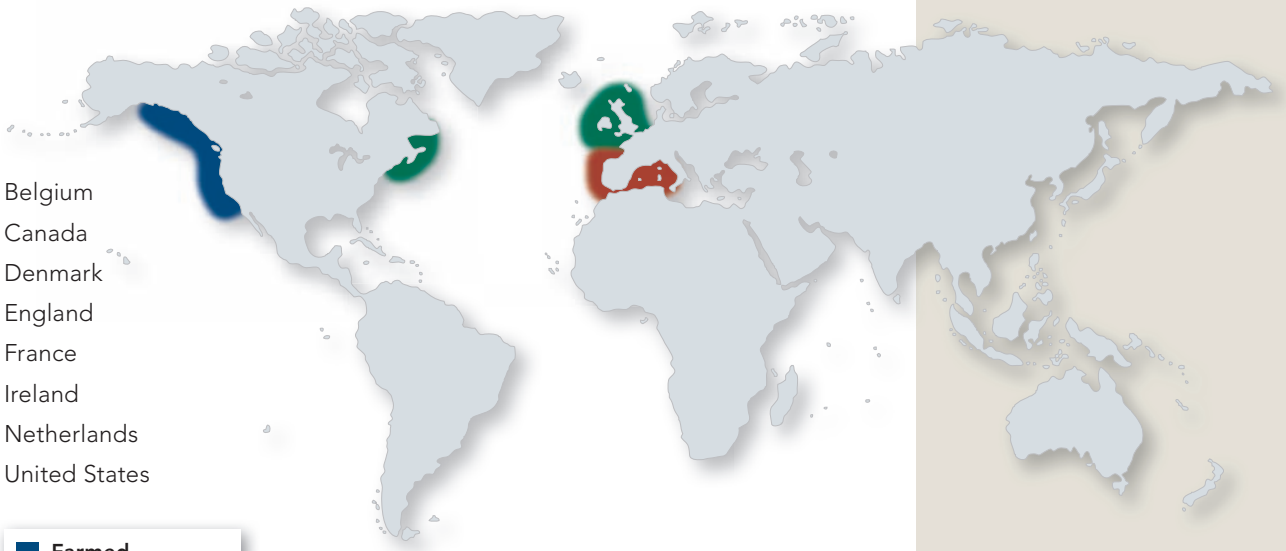
Frozen

- Whole
- Halfshell
- Shucked meats, cooked and uncooked

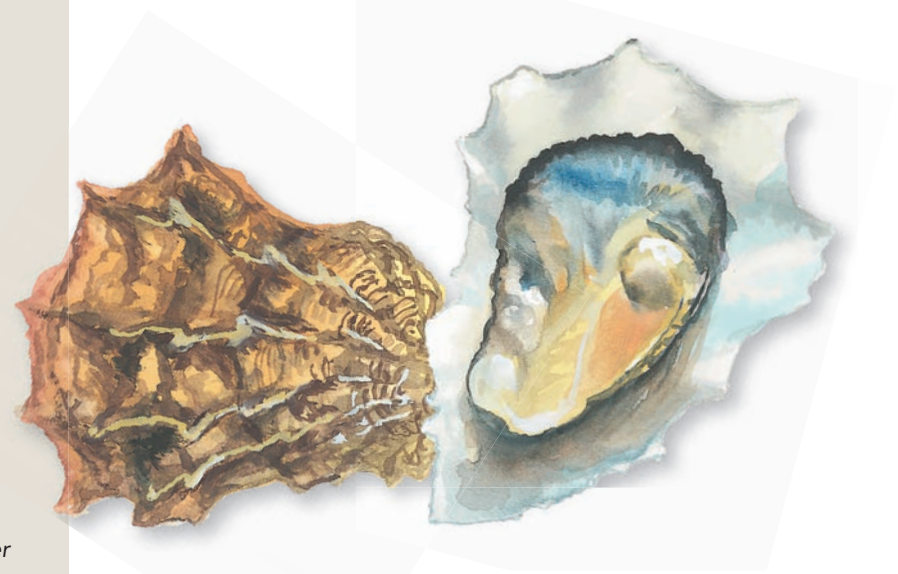
Value-added

- Smoked

GLOBAL SUPPLY



Oyster, Pacific



French	*Huître creuse du Pacifique*
German	*Pazifische Auster*
Italian	*Ostrica*
Japanese	*Kaki*
Spanish	*Ostra*

Scientific name: *Crassostrea gigas*
Market name: Oyster
Common names: Pacific oyster, Japanese oyster

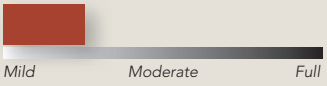
YOU SHOULD KNOW...

While raw oysters pose a danger to a small segment of the population, Pacific oysters grown in cold waters of the United States or Canada are not subject to *Vibrio*.

Unlike the native Eastern oyster, the Pacific oyster is a Japanese transplant, brought to this country after the turn of the century to revitalize the West Coast oyster industry after its native Olympia species (*Ostrea lurida*) crashed. Hearty and easy to propagate, the Pacific oyster is now the most widely cultured oyster in the world. It is farmed from California to Alaska and in Australia, Europe and Asia. Washington state leads North American production, followed by British Columbia, California, Oregon and Alaska. In the wild, Pacific oysters are found from Alaska to California and in temperate waters around the world. They are nearly always, however, a farm-raised product, grown in suspended systems in bags, racks, lanterns or on ropes. They are named for their region of growth, such as Westcott Bays, Quilcenes, Willapa Bays and so forth. The deep-cupped, smaller Kumamoto is the Pacific oyster held in highest repute by Northwest slurpers.

Northwest oyster farmers also produce "all-season," sterile Pacific oysters called triploids. Because they don't spawn, they're in season year-round.

FLAVOR



TEXTURE

PRODUCT PROFILE

Pacific Northwest oysters are mild and sweet, with a briny flavor and crisp texture. Those from California have a slightly stronger taste. As with all oyster species, flavor depends on the waters in which it is grown. The deeply cupped, elongated shell is curly, thick and silvery gray to gold. Meat is creamy white, sometimes with a dark fringe around the mantle. Shell and meat colors vary by region and season.

Oyster meats should be plump and juicy. Dramatic meat discoloration suggests poor quality, but slight shades of pink, green or black may reflect diet and regional conditions. How do you know if an oyster's alive? Just tap on the shell to see if it closes. Or sniff: A dead oyster smells like sulfur.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	81
Fat Calories	20.7
Total Fat	2.3 g
Saturated Fat	0.5 g
Cholesterol	50 mg
Sodium	106 mg
Protein	9.5 g
Omega-3	0.7 g

Source: USDA

COOKING TIPS

Aficionados enjoy Pacific oysters on the halfshell. For a special dipping sauce, mix 1/4 cup soy sauce, 4 teaspoons of apple cider (or 2 of white vinegar), 2 teaspoons of Japanese hot red pepper, 1 teaspoon of toasted white sesame seeds, 2 teaspoons of sugar and 1 finely chopped green onion. Try whole oysters on the grill; when the shell opens, they're done. With any method, cook just till the meat plumps or the mantle curls.

Substitutions Eastern oysters, European oysters

GLOBAL SUPPLY

COOKING METHODS

- ■ Bake
- □ Broil
- ■ Fry
- ■ Grill
- □ Poach
- ■ Sauté
- ■ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Live

Singles or clusters ("clumps")

Fresh

Halfshell
Shucked meats

Frozen

Whole
Halfshell
Shucked meats

Value-added

Canned meats, soups and stews
Smoked meats
Breaded (frozen)
Entrées (frozen)

Scallop, bay

French	*Pecten*
German	*Kammuschel*
Italian	*Ventaglio*
Japanese	*Itayagai*
Spanish	*Vieira*

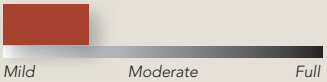
Scientific name: *Argopecten irradians*
Market names: Scallop, bay scallop
Common names: Cape Cod, Cape, Long Island or Peconic scallop, China bay

YOU SHOULD KNOW...

Beware of calico scallops being sold as bays. Shucked calicos are easy to identify because they are pale white, opaque around the edges and very small — even smaller than bays.

A small cousin of sea scallops, bay scallops average 70 to 100 meats per pound. They are dredged, raked or tonged from bays, harbors and salt ponds along the East Coast from Atlantic Canada to North Carolina and processed ashore. They are also farmed in Nova Scotia and New England in suspended systems. A less expensive, farmed bay scallop is imported from China. Though there is a niche market in the United States for whole, live scallops, the product typically seen on the market is actually just part of the whole animal; the guts are removed and discarded, leaving just the adductor muscle, which is the edible meat. The meats are available "wet" (soaked in a preservative like tripolyphosphate, which whitens the scallop and extends shelf life) or "dry" (untreated). Oversoaked scallops look artificially shiny, opaque and flabby and will have a soapy feel and aftertaste. They will also release more liquid and shrink more when cooked.

FLAVOR



TEXTURE

PRODUCT PROFILE

Mild and sweet, bay scallops are considered the best-tasting of the scallop species. Raw, the lean, cork-shaped meat is translucent, with color ranging from creamy to pink. The texture should be firm and moist, not slippery and spongy. Cooked meat is opaque white and firm.

Top-quality scallops should have an ivory translucence and elastic springiness that allows them to keep their shape. Fresh bay scallops smell sweet and seaweedy. They should not be sitting in water. Sour-smelling scallops — especially with overtones of iodine — should be rejected.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	87
Fat Calories	7
Total Fat	0.8 g
Saturated Fat	0.8 g
Cholesterol	33 mg
Sodium	161 mg
Protein	16.8 g
Omega-3	0.2 g

Source: USDA
Photo courtesy of WorldCatch

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [ ] Grill
- [x] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Live

Fresh

Meats

Frozen

Meats (IQF)

Blocks

Value-added

Smoked meats

Breaded/battered (frozen)

Entrées (frozen)

COOKING TIPS

Bay scallops are small and cook quickly. While scallops are most commonly eaten cooked, bays are sometimes enjoyed raw because of their size and freshness. However, consumers in high-risk categories should avoid eating all raw shellfish. For a scallop ceviche, use lemon or lime juice to "cook" the tender meats. Steam gently for use in salads. Don't overcook; scallops will toughen and lose flavor. They're done as soon as the outside of the meat turns opaque.

Substitutions Sea scallops, Calico scallops

GLOBAL SUPPLY

Scallop, sea

French	*Pétoncle*
German	*Atlantischer Tiefwasser-Scallop*
Japanese	*Hotategai*
Spanish	*Vieira*

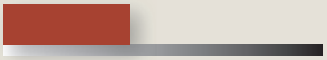
Scientific name: *Placopecten megallanicus*
Market name: Scallop
Common name: Sea scallop

YOU SHOULD KNOW...

"Dry" (untreated) sea scallops are your best bet, since you'll be paying for water weight with oversoaked meats.

This species supports the largest scallop fishery in the world. Sea scallops are dredged year-round from Labrador to New Jersey. Since sea scallops die out of water, they are always shucked at sea and kept on ice, if not frozen aboard. The meat counts range from 20 to 40 per pound. New Bedford, Massachusetts, is the largest sea scallop port, and the auction there usually sets the price. Virginia, New York and New Jersey are also important suppliers. Sea scallops are farmed in New England and Newfoundland, but production is limited. Only the adductor muscle, which allows scallops to "swim" by clicking their shells together, is eaten. This mobility helps them escape pollutants that immobile bivalves like mussels, clams and oysters can't avoid. Avoid "wet" scallops that have soaked too long in chemical additives designed to maintain texture and taste. They'll be flabby and opaque and will shed water and weight rapidly.

FLAVOR



TEXTURE

PRODUCT PROFILE

The largest commercially available scallops, sea scallops have a sweet, rich taste that ranges from mild to briny. Raw, the drum-shaped meat is a shiny, creamy white, sometimes with pinkish or brown spots. Top-quality scallops should have an ivory translucence and elastic springiness that allows them to keep their shape. Cooked meat is opaque white with a firm, lean texture.

Scallops are generally less susceptible to contamination than other shellfish, primarily because normally only the well-guarded adductor muscle is eaten. Still, persons in high-risk health categories should not eat them raw.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	87
Fat Calories	7
Total Fat	0.8 g
Saturated Fat	0.8 g
Cholesterol	33 mg
Sodium	161 mg
Protein	16.8 g
Omega-3	0.2 g

Source: USDA

COOKING METHODS

- [x] Bake
- [x] Broil
- [x] Fry
- [x] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

Meats

Frozen

Meats (IQF or block)

Value-added

Breaded/battered

Entrées

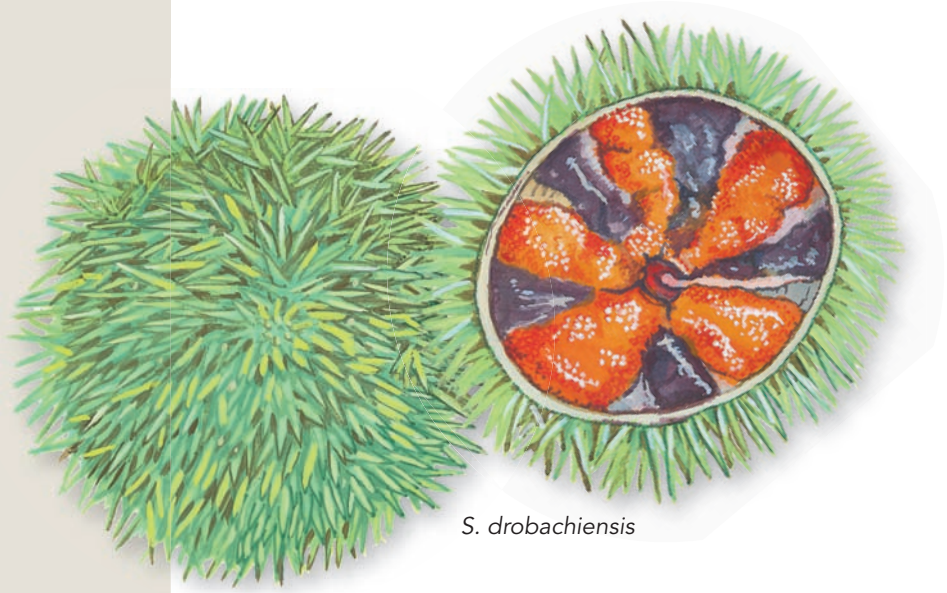
COOKING TIPS

Though they may be large, sea scallops still cook quickly. Recipes often suggest cutting them in half across the grain before cooking, but the large size makes sea scallops a natural for the grill. Don't microwave scallops — they can explode at higher settings.

Substitutions Bay scallops

GLOBAL SUPPLY

Sea urchin



S. drobachiensis

French	*Oursin*
German	*Seeigel*
Japanese	*Uni*
Spanish	*Erizo de mar*

Scientific names: *Strongylocentrotus fransiscanus; S. drobachiensis; S. purpuratus*
Market name: Sea urchin
Common names: Red sea urchin, green sea urchin, purple sea urchin

YOU SHOULD KNOW...

Urchins spawn during late winter and early spring. Just before spawning, they secrete a milky fluid; afterward, the roe is shriveled, flavorless and unmarketable. Quality is best from September to April.

There are about 500 species of sea urchins worldwide, but the major commercially valuable species in the United States are the red, green and purple sea urchins. The spherical echinoderms have a hard, spiny shell called a "test," which contains a star-shaped mass comprising five skeins of gonads (in males) or roe (females); both are marketed as roe. The sushi designation uni is also widely used, because the Japanese are major urchin consumers. All three urchin species are harvested on the U.S. Pacific Coast; red and purple are found from Baja, California to Alaska, and greens are taken from Washington to Alaska. Only green urchins are commercially harvested on the Atlantic Coast, from eastern Canada to Cape Cod. The largest U.S. producers are California (red urchins) and Maine (green urchins). Most product winds up in Japan. West Cost urchins are harvested by divers. East Coast urchins are taken by diving and trawling.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

The largest of the three urchins is the red, with a shell diameter of around 7 inches; greens are the smallest at around 1 1/2 inches. Urchin roe ranges in color from canary yellow to orange. The membrane holding the roe should be intact. Cleaned uni is soaked in an alum-salt solution that firms the membrane.

High-quality uni has a sweet taste and a smooth, buttery texture. Male roe is silkier; female roe is textured more like fine cream of wheat.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	150
Fat Calories	50
Total Fat	10 g
Saturated Fat	0 g
Cholesterol	200 mg
Sodium	200 mg
Protein	10 g
Omega-3	0.5 g

Source: California Sea Urchin Commission
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [ ] Broil
- [ ] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [x] Steam

PRIMARY PRODUCT FORMS

Fresh

Roe

Frozen

Roe

Value-added

Salted roe
Canned roe
Fermented paste

COOKING TIPS

Uni can be eaten from the shell as is, or spread on crackers with a dash of lemon juice. Use it as sushi, in omelets, in rich seafood sauces or as a filling in crepes. Fresh urchin roe is best, since frozen roe loses some texture and the membrane sacs can break, but it's still fine for sauces and such.

Substitutions None

GLOBAL SUPPLY

Shrimp, black tiger

French	*Crevette*
German	*Garnele*
Italian	*Gambero*
Japanese	*Ebi*
Spanish	*Camarón*

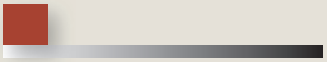
Scientific name: *Penaeus monodon*
Market name: Shrimp
Common names: Black tiger, giant tiger, jumbo tiger shrimp

YOU SHOULD KNOW...

Just because black tigers are farmed doesn't mean they haven't been treated. Some countries routinely treat tigers with sulfites to prevent melanosis. Pitted shells and a soapy flavor indicate oversoaking. Chem-free shrimp is available, but be prepared to pay a premium.

Striped like its jungle namesake, the black tiger shrimp is available year-round and is one of Asia's major aquaculture products. Most tiger shrimp is farmed, though a significant amount is harvested from the wild by trawlers working mud bottoms from very shallow water to depths beyond 300 feet. The largest of 300 commercially available shrimp species worldwide, tigers can grow to 13 inches, but harvest size averages 9 to 11 inches. Many countries supply black tigers from both farmed and wild sources. The species is distributed over a huge range, from east and southeast Africa through the Red Sea and Arabian Gulf, around the Indian subcontinent and through the Malay Archipelago to northern Australia and the Philippines. Important suppliers include Thailand, Bangladesh, India, Indonesia and Malaysia. Asian suppliers generally offer state-of-the-art packing and processing; many follow HACCP guidelines developed for U.S. operations.

FLAVOR



TEXTURE

PRODUCT PROFILE

Farmed black tiger shrimp have a mild, almost bland flavor compared to the pronounced taste of ocean-harvested Gulf shrimp. Cooked tiger's meat is also softer than that of other shrimp species. Tigers have gray to black stripes on gray or bluish shells and associated stripes on the peeled meat. The cooked shell turns bright red. The white flesh is tinged with orange if cooked peeled and red if cooked in the shell.

Meat should be slightly resilient and moist. Improper storage temperatures, refreezing or extended frozen storage can turn shrimp tough, dry and fibrous. A black spot on the shell indicates melanosis. It's not a health issue in early stages but indicates general poor quality.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	106
Fat Calories	15.3
Total Fat	1.7 g
Saturated Fat	0.3 g
Cholesterol	152 mg
Sodium	148 mg
Protein	20.3 g
Omega-3	0.53 g

Source: USDA
Photo courtesy of High Liner Foods

COOKING METHODS

- ☐ Bake
- ■ Boil
- ■ Broil
- ☐ Fry
- ■ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

COOKING TIPS

Large tiger shrimp tails are excellent hors d'oeuvres in classic shrimp cocktails or grilled on skewers. They're good with pasta or in casseroles, since they can withstand tossing with other ingredients. Their thick shells hold heat, so black tigers cook more quickly than the other Penaeids. Watch them closely; they toughen if overcooked. For maximum quality, eat tiger shrimp within two days of thawing, though they will last three to four days properly refrigerated.

Substitutions Lobster tails, Crawfish, Other Penaeid shrimp

PRIMARY PRODUCT FORMS

Frozen

- Whole
- Blocks
- IQF
- Split, butterfly, fantail
- Pieces

Value-added

- Breaded
- Canned (small shrimp)
- Dried
- Entrées

GLOBAL SUPPLY

Shrimp, Chinese white

French	*Crevette du Maroc*
German	*Chinesische Gamele*
Japanese	*Ebi*
Spanish	*Camarón*

Scientific name: *Penaeus chinensis*
Market name: Shrimp
Common names: Chinese white shrimp, China whites, fleshy prawn

YOU SHOULD KNOW...

While China whites sell for much less than domestic white shrimp, they're similar enough that repacking of Chinese shrimp as domestic product often goes unnoticed. Know your supplier.

A variety of shrimp similar to Pacific or Gulf whites, Chinese whites are harvested from farm ponds and wild-caught by trawlers, mainly in the Yellow Sea and East China Sea and along the Korean coast. Chinese whites can grow to more than 7 inches. The most commonly used name for these shrimp is *Penaeus orientalis,* but *P. chinensis* is its earliest description and the one considered scientifically correct. Though a tropical shrimp, Chinese whites are grown in cooler waters than most Penaeids and have a fragile meat more characteristic of coldwater shrimp. Like all shrimp, Chinese whites should be of uniform color, size and condition and should smell like seawater. Sulfur or ammonia odors indicate decomposition. Chlorine smells may indicate use of this chemical to mask off-odors. Grassy or corn-on-the-cob odor is often associated with pond-raised shrimp. These are "feed" odors caused by algal blooms in the ponds and run-off from adjacent agricultural lands.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

PRODUCT PROFILE

Chinese whites have a mild flavor. The cooked meat is softer than Gulf or Pacific whites in texture (more like a coldwater shrimp) and sometimes a bit watery. Raw meat should be firm, slightly resilient and moist. Regardless of species, most raw shrimp meat is translucent white to gray. Cooked meat is white with pink streaks.

The shells of white, brown and pink shrimp are generally colored as their names imply, though variations are such that brown and white shrimp can sometimes look alike. White shrimp have a translucent white shell with pink tinges on the rear segments and swimmer fins.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	106
Fat Calories	15.3
Total Fat	1.7 g
Saturated Fat	0.3 g
Cholesterol	152 mg
Sodium	148 mg
Protein	20.3 g
Omega-3	0.53 g

Source: USDA

COOKING TIPS

Shrimp cook quickly; two minutes should be sufficient. They're done when tails curl and meat is no longer translucent. Spice up Chinese whites with a garlic sauce. Lightly salt a pound of deveined white shrimp. Heat 1/4 cup of olive oil in a skillet. Add four sliced garlic cloves and one dried hot red chili, seeded and cut into four pieces. Sauté until garlic is light brown. Add shrimp and cook over high heat, stirring until done.

Substitutions Gulf white shrimp

GLOBAL SUPPLY

COOKING METHODS

- ☐ Bake
- ■ Boil
- ■ Broil
- ☐ Fry
- ■ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

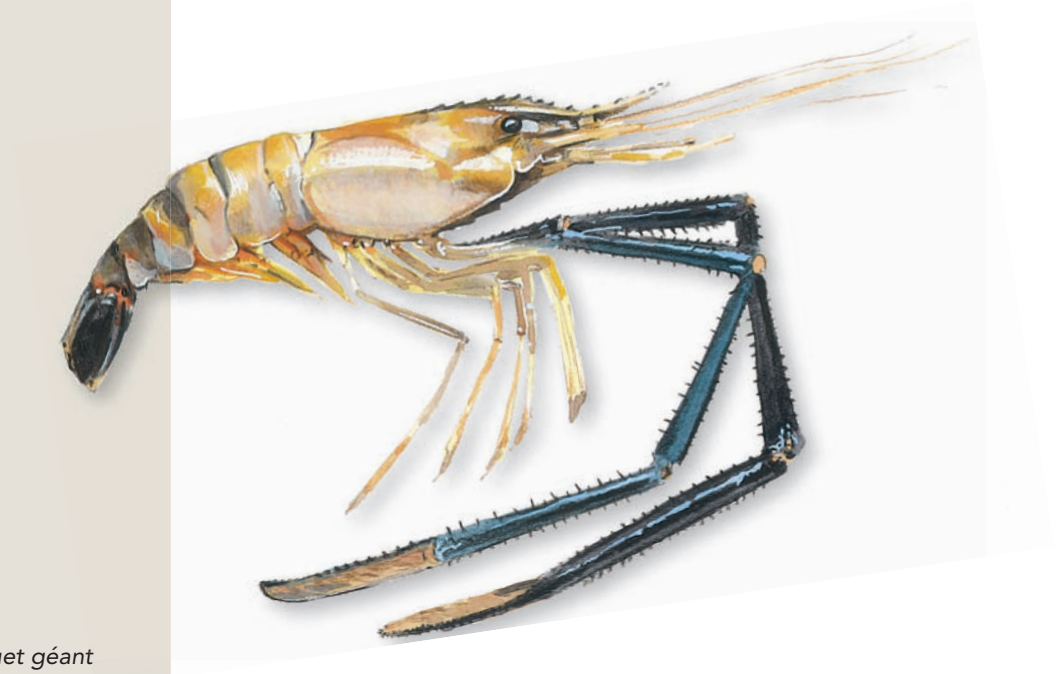
Frozen

- Whole
- Blocks
- IQF
- Cooked
- Split, butterfly, fantail
- Pieces

Value-added

- Breaded
- Canned (small shrimp)
- Frozen tins
- Dried
- Prepared entrées

Shrimp, freshwater



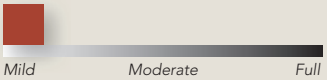
French	*Bouquet géant*
German	*Rosenberg-Garnele, Felsengarnele*
Japanese	*Onitenagaebi*
Spanish	*Camarón gigante*

Scientific name: *Macrobrachium rosenbergii*
Market name: Freshwater shrimp
Common names: Giant freshwater prawn, Malaysian prawn, Hawaiian blue prawn, giant river prawn

YOU SHOULD KNOW...

Giant freshwater shrimp are more perishable than other species so should be kept cold until they are processed. The flesh can soften excessively if left in a chilled state too long with the head on. Blanching prior to chilled holding is recommended.

FLAVOR



TEXTURE

More than 200 species of freshwater prawns, all members of the family Palaemonidae, are important to the commercial market. The most important belong to the genus *Macrobrachium*, and the freshwater shrimp most common to Western markets is the giant *M. rosenbergii*, also known as giant river prawn. It is found wild from Pakistan and northwest India to Malaysia, New Guinea, the Philippines and northern Australia and is farmed in freshwater areas throughout the world. In the United States, it is commercially farmed in Hawaii and experimentally in some southern states, notably Tennessee. This fast-growing shrimp can reach a weight of 4 to 6 ounces. In the wild, it can attain lengths of over 1 foot. In cultured ponds, it is generally harvested at 6 to 7 inches, or about six prawns per pound, head-on. There are limited markets for live or fresh giant prawns; most are sold as frozen tails.

PRODUCT PROFILE

The freshwater shrimp has a delicate, sweet flavor, somewhat like lobster, and firm, white flesh. Some say the flavor and texture aren't as satisfying as those of the Penaeid shrimp species.

The shrimp gets the name "Hawaiian blue prawn" from its bright-blue tail and long blue legs and antennae. The tail is the only edible part of the animal.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	80
Fat Calories	10.8
Total Fat	1.2 g
Saturated Fat	0.5 g
Cholesterol	155 mg
Sodium	40 mg
Protein	17.6 g
Omega-3	N/A

Source: Tennessee Dept. of Agriculture
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [x] Boil
- [x] Broil
- [ ] Fry
- [x] Grill
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Live (rare)

Fresh (rare)

Whole

Frozen (most common)

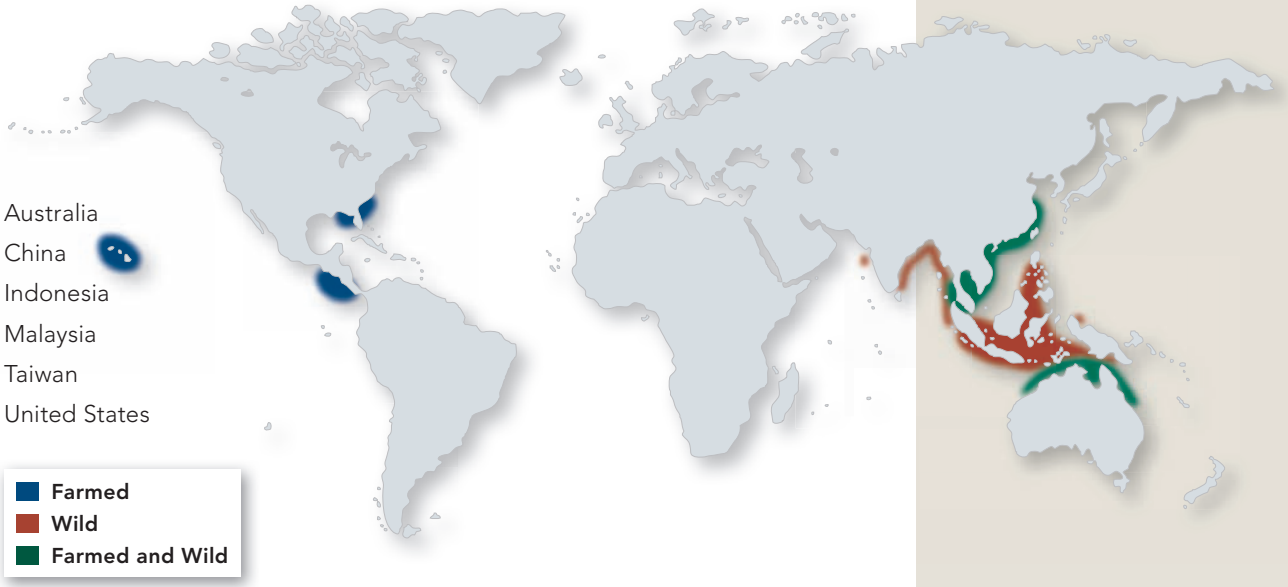
Tails, shell-on or off; whole

COOKING TIPS

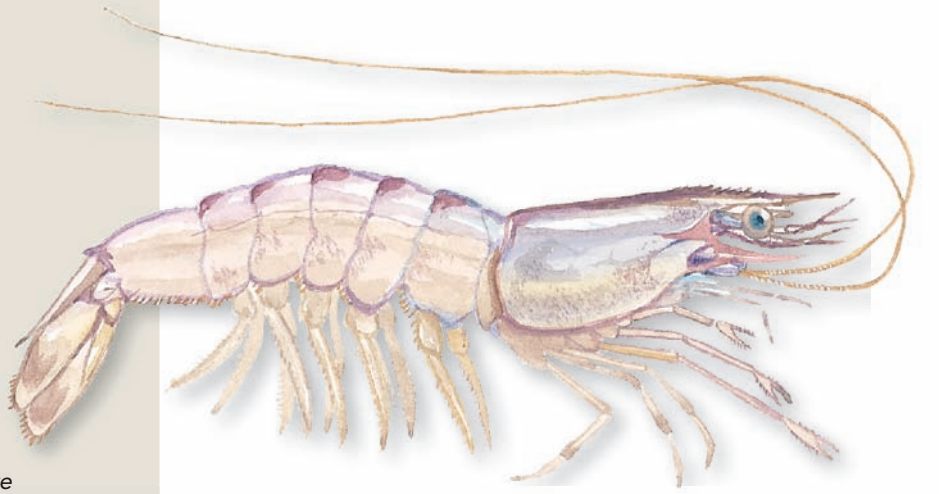
Cooking freshwater shrimp with the heads on preserves the natural juices and enhances the delicate flavor. They can be cooked peeled or in the shell, but the meat stays firmer in the shell. If boiling, bring the liquid to a brisk boil before inserting the shrimp and cook for 4 minutes.

Substitutions Lobster, Warmwater shrimp

GLOBAL SUPPLY



Shrimp, Gulf



French	*Crevette Américaine*
German	*Garnele*
Italian	*Mazzancolla*
Japanese	*Ebi*
Spanish	*Camerón, Langostino*

Scientific name: *Penaeus* spp.
Market name: Shrimp
Common names: Gulf shrimp; pinks (*P. duorarum*), northern pinks, "hoppers," "skippers"; browns (*P. aztecus*), northern browns, "redtails"; white (*P. setiferus*), Gulf whites, northern whites, Mexican whites

YOU SHOULD KNOW...

Don't pay white shrimp prices for brown shrimp. Brown shrimp have a groove in the last tail segment that is not present in Gulf whites. That's what processors check to tell what species they've got.

FLAVOR

Mild — Moderate — Full

TEXTURE

Delicate — Medium — Firm

Brown, white and pink shrimp are a triad of warmwater animals known collectively as "Gulf shrimp." Commercially important to both the United States and Mexico, Gulf shrimp are found along the southeastern U.S. coast, as far north as Maryland, and along the entire western Gulf, particularly on Mexico's Campeche Banks. All Gulf shrimp are harvested from the wild with trawl nets. Pink shrimp are the largest Gulf species, reaching 11 inches. They are usually sold with their heads still on, giving the impression of a lot of shrimp, since two-thirds of the body length is the head. Gulf whites are concentrated south of the Carolinas; however, the bulk of the harvest comes from the Gulf of Mexico. White shrimp grow to 8 inches. Variations in shell color can cause white shrimp to be confused with brown shrimp from the same area. Brown shrimp are concentrated off the Texas-Louisiana coast. Males reach 7 inches, while females grow to 9.

PRODUCT PROFILE

Gulf shrimp are generally flavorful and sweet, with slight variations in taste according to the species. Pinks are tender and sweet. Browns are firm, though somewhat bland, and sometimes have a hint of iodine. Whites, the standard against which other shrimp species — domestic and imported — are often measured, are sweet and firm.

It can be hard to tell the Gulf species apart. Part of the confusion stems from naming them by colors: white, pink and brown, since a pink can look white, a brown can be gray, etc. Cooked shells of all species are pinkish-red. Raw meats are translucent pink to gray. Cooked meats are pearly white with pink and red shadings.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	106
Fat Calories	15.3
Total Fat	1.7 g
Saturated Fat	0.3 g
Cholesterol	152 mg
Sodium	148 mg
Protein	20.3 g
Omega-3	0.53 g

Source: USDA
Photo courtesy of Ocean Garden Products

COOKING METHODS

- ☐ Bake
- ■ Boil
- ■ Broil
- ☐ Fry
- ■ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

COOKING TIPS

Flavorful and firm Gulf shrimp can be breaded, stuffed, boiled with spices or barbecued. Shrimp cooks in just 60 to 90 seconds at a rapid boil. When the meat turns opaque, it's done. Remember not to overcook — it will toughen the meat.

Substitutions Pacific white shrimp, Crawfish tails

PRIMARY PRODUCT FORMS

Fresh

- Tails (raw or cooked)

Frozen

- Whole (raw or cooked)
- Tails (cooked)
- Blocks
- IQF

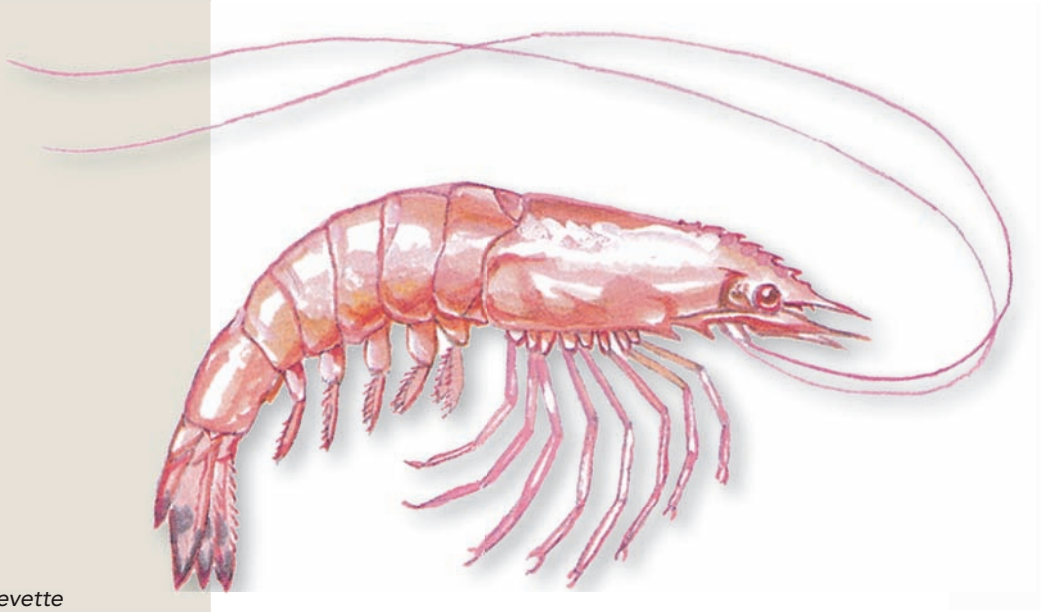
Value-added

- Butterflied
- Breaded

GLOBAL SUPPLY

Mexico
United States

Shrimp, Pacific white



French	*Crevette*
German	*Garnele*
Italian	*Gambero*
Japanese	*Ebi*
Spanish	*Quisquilla*

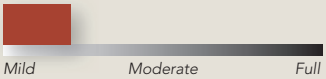
Scientific names: *Penaeus vannamei; P. stylirostris*
Market name: Shrimp
Common names: White-leg, Mexican white, Pacific white, Ecuadoran white; blue shrimp, steelies

YOU SHOULD KNOW...

Mexico is one of the few countries to separate wild-run shrimp into two grades. No. 1's are Mexico's top-grade Pacific whites; they should have no black spots (melanosis), and there should be no broken pieces.

Pacific white shrimp are among the most widely cultivated shrimp in the world. This is due mainly to ease of cultivation and rapid growth rate; harvesting begins after 120 days. The two warmwater species known as Pacific whites are *Penaeus vannamei,* found from Sonora, Mexico, to northern Peru, and *P. stylirostris,* which ranges from Baja, California to Peru. Both are also harvested from the wild by trawlers, though the volume of farmed is considerably greater than trawl-caught supplies — especially *vannamei* from Ecuador. In the United States, Pacific whites are farmed in Texas and South Carolina. Similar to Gulf white shrimp, both of these Pacific species can reach about 9 inches. IQF and block-frozen whole shrimp are becoming more popular as farmers look to pass processing costs on to end-users. Quality of pond-raised Pacific white shrimp is normally high, owing to strict controls and the lack of at-sea time that accompanies shrimp harvested from the wild.

FLAVOR



TEXTURE

PRODUCT PROFILE

Pacific white shrimp is firm, sweet and mild. The *stylirostris* is a bit more salty than the *vannamei* species. Though it may be difficult to tell them from Gulf whites, if you look closely, you'll see that *P. vannamei* are creamy white, while Gulf whites are grayish-white. The *stylirostris* are often white with a greenish or bluish tint. Raw meat of both species is white but turns whitish pink when cooked.

Peeled shrimp are usually dipped in phosphates to minimize drip loss. It's a standard practice, as long as the product isn't oversoaked, and should be stated on the label. Thawed shrimp that feels "soapy" has been soaked too long and has absorbed excess water.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	106
Fat Calories	15.3
Total Fat	1.7 g
Saturated Fat	0.3 g
Cholesterol	152 mg
Sodium	148 mg
Protein	20.3 g
Omega-3	0.53 g

Source: USDA
Photo courtesy of Ocean Garden Products

COOKING METHODS

- ☐ Bake
- ■ Boil
- ■ Broil
- ☐ Fry
- ■ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Frozen

- Whole (raw or cooked)
- Blocks
- IQF
- Cooked headless
- Split, butterfly, fantail
- Pieces

Value-added

- Breaded
- Prepared entrées

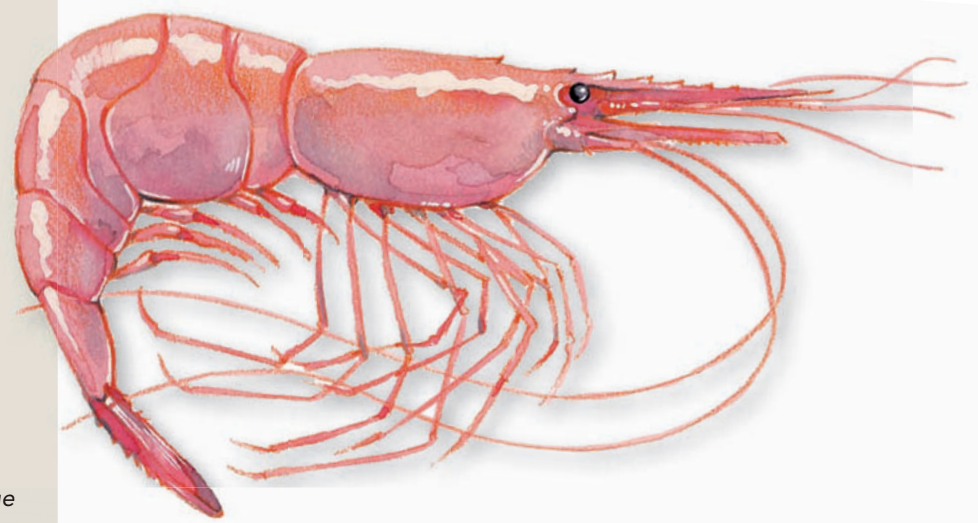
COOKING TIPS

Try simmering shrimp in beer, with celery and garlic. For a classic, use large Pacific white shrimp to make Scampi in Wine. Add one finely chopped garlic clove and 2 teaspoons of finely chopped parsley to 3 tablespoons of melted butter. Brown lightly. Add 1 tablespoon of fresh lemon juice, 1/3 cup of dry white wine and salt and pepper, to taste. Add 1 pound of shelled, deveined shrimp. Sauté quickly, stirring until done.

Substitutions Small lobster tails, Chinese white shrimp, Crawfish tails

GLOBAL SUPPLY

Shrimp, pink



French	*Crevette nordique*
German	*Tiefseegarnele*
Italian	*Gambero*
Japanese	*Hokkokuakaebi*
Spanish	*Camarón rojo*

Scientific name: *Pandalus* spp.
Market names: Shrimp, pink shrimp
Common names: Northern shrimp, pink shrimp, coldwater shrimp, salad shrimp

YOU SHOULD KNOW...

Because raw shrimp is relatively perishable, it's wise to purchase IQF product. You can remove any amount of the frozen shrimp from a bag and return it to the freezer without harm.

Found in most northern waters, pink shrimp rank among the most important commercial shrimp species in the world. In the North Atlantic, they range from Greenland south to Martha's Vineyard in the west, and from Iceland and Greenland south to Britain in the east. In the northeastern Pacific, they range from the Bering Sea south along the North American coast to Oregon. In the western Pacific they are found from Russia south to Japan and South Korea. *P. jordani,* a close relative of *P. borealis,* is found exclusively along the Pacific Coast from Queen Charlotte Sound in Alaska to San Diego. Trawlers harvest pink shrimp over clay and mud bottoms in depths ranging to 4,500 feet. Rarely exceeding 5 inches, pinks are smaller than many shrimp species (average market size for whole pink shrimp is 40 to 55 shrimp per pound). They are also hermaphrodites, spending their first year and a half as males, then turning into females.

FLAVOR

TEXTURE

PRODUCT PROFILE

Pink shrimp have a very sweet taste, more flavorful than warmwater shrimp. The tail of the live pink shrimp is more red than pink, and the shrimp and shell are translucent. Cooked, the shell is pink, and the meat is an opaque white tinged with pink. The cooked meat is fairly firm, though less so than that of warmwater shrimp, and moist. The taste and texture of both pink shrimp species are practically indistinguishable.

Pink shrimp is usually sold peeled, cooked and frozen. Watch for an acrid aroma in thawed or fresh shrimp; it is the first sign of deterioration.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	106
Fat Calories	15.3
Total Fat	1.7 g
Saturated Fat	0.3 g
Cholesterol	152 mg
Sodium	148 mg
Protein	20.3 g
Omega-3	0.53 g

Source: USDA
Photo courtesy of The California Seafood Council

COOKING METHODS

- ☐ Bake
- ■ Boil
- ☐ Broil
- ■ Fry
- ☐ Grill
- ■ Sauté
- ☐ Smoke
- ■ Steam

PRIMARY PRODUCT FORMS

Fresh

- Whole (raw or cooked)
- Tails

Frozen

- Whole (raw or cooked)
- Tails (peeled, cooked)

Value-added

- Canned
- Smoked

COOKING TIPS

Pink shrimp are often referred to as salad shrimp because they are small, which can limit applications. They are best used in salads, casseroles, quiches and omelets and as a garnish for other seafood. Raw shrimp meats can be sautéed with garlic or battered and quickly fried. Whole shrimp can be cooked in or over boiling water. They're done when the tails curl and the body is no longer translucent; it takes only moments, so watch closely.

Substitutions Crab meat can be substituted for recipes calling for cooked shrimp meat; Chinese white shrimp, Gulf pink shrimp

GLOBAL SUPPLY

Shrimp, rock

French *Boucot ovetgernade*
German *Furchen-Geisselgarnele*
Spanish *Camarón de piedra*

Scientific name: *Sicyonia brevirostris*
Market name: Rock shrimp
Common name: Brown rock shrimp

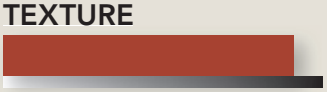
YOU SHOULD KNOW...

Orange stripes in rock shrimp meat signify temperature abuse. Dark spots on the shell of whole rock shrimp or tails are also a sign of poor handling.

The rock shrimp is a deepwater cousin of the pink, brown and white Gulf shrimp species (*Penaeus* spp.), but its popularity in the domestic market was slower to develop. The crustacean gets its name from its rock-hard shell, which presented a challenge for processors until a machine was developed to split the tough exoskeleton and devein the shrimp, boosting its availability. Rock shrimp occur from Norfolk, Va., south through the Gulf of Mexico to Mexico's Yucatan Peninsula. They are harvested by trawling with reinforced nets that can withstand abrasion from coral and rocky bottoms, where the shrimp are caught. Most of the domestic catch is landed on Florida's east coast. Because rock shrimp are so hard for end users to peel, almost all the harvest is sold as meats. The shrimp are generally small; the largest size is about 21 to 25 shrimp per pound.

FLAVOR

TEXTURE



PRODUCT PROFILE

Raw rock-shrimp meat is transparent or clear white, with fine pinkish or purple lines.

The shrimp has a firm texture and sweet, succulent flavor, similar to lobster.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw)

AMOUNT PER SERVING	
Calories	96
Fat Calories	8
Total Fat	0.9 g
Saturated Fat	0.4 g
Cholesterol	122.8 mg
Sodium	333.3 mg
Protein	18.4 g
Omega-3	N/A

Source and photo courtesy of Florida Bureau of Seafood & Aquaculture Marketing

COOKING METHODS

- [x] Boil
- [x] Broil
- [x] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

COOKING TIPS

The rock shrimp's small size suits it for almost any recipe that doesn't require whole shrimp for presentation. P&D meats or pieces are ideal for stir-fries and other quick recipes, like pasta dishes and pizza. If using shell-on rock shrimp, split and broil 4 inches from the heat source for 2 minutes or until meat is opaque in the shell. Or drop into salted, boiling water, stir and cook for 35 seconds. Drain in a colander and rinse with cold water.

Substitutions Langostinos, Lobster, Gulf shrimp species

PRIMARY PRODUCT FORMS

Fresh

- P&D meats (most common)
- Whole
- Headless, shell-on or split

Frozen

- P&D meats (most common)
- Whole
- Headless, shell-on or split
- Blocks

Value-added

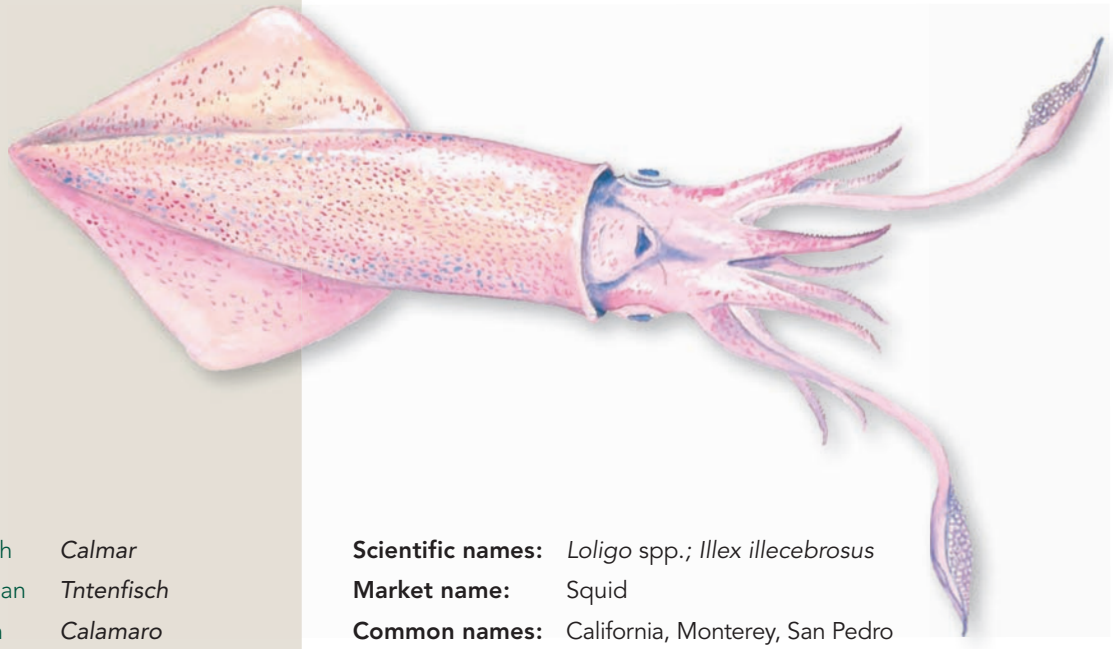
- Breaded meats

GLOBAL SUPPLY

Mexico

United States

Squid



French	*Calmar*
German	*Tntenfisch*
Italian	*Calamaro*
Japanese	*Ika*
Spanish	*Calamar*

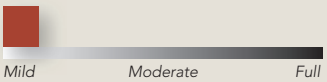
Scientific names: *Loligo* spp.; *Illex illecebrosus*
Market name: Squid
Common names: California, Monterey, San Pedro or market squid (*L. opalescens*); long-finned squid, winter squid, Boston squid (*L. pealei*); short-finned squid, summer squid (*I. illecebrosus*)

YOU SHOULD KNOW...

Watch out that lower-value *Illex* isn't substituted for the more desirable and expensive long-finned *Loligo*. *Illex* is larger and coarser than *Loligo*.

Squid are cephalopods, a word meaning "head foot." They are a close relative of the octopus and a distant relative of bivalve mollusks. More than 300 species inhabit the world's oceans, but fewer than a dozen comprise 90 percent of the global catch; of them, three comprise the domestic suppy. West Coast "market squid" (*L. opalescens)* are 3 to 5 inches long; East Coast squid, including long-finned "winter squid" (*L. pealei)* and short-finned "summer squid" *(Illex illecebrosus)*, are a bit larger. Summer squid is the largest commercial species. West Coast squid, found from Alaska to California, are caught with purse seines from "light boats" that lure them to the surface from depths of 60 to 200 feet with high-intensity lamps. On the East Coast, squid are trawled and trapped from Canada to North Carolina in coastal waters and up to 200 miles offshore. Because the domestic market prefers a white-meated product, squid are sometimes "bleached" in a brine solution to enhance whiteness.

FLAVOR



TEXTURE

PRODUCT PROFILE

Cooked squid is mild and has a subtle sweetness. The meat is firm yet tender. *Illex* squid has large, 8- to 12-inch tubes and is coarser than *Loligo*. Raw squid meat is ivory beneath a naturally speckled membrane. Cooked squid is opaque white and firm. Fresh or thawed squid should be moist, shiny and ivory colored. Pink, yellow or purple flesh indicates deterioration.

Edible parts of the squid include the arms (tentacles), the mantle (tube) and the fins (wings). The body is covered with a thin skin that may be removed before cooking. Squid ink is often used to make black pasta.

NUTRITION FACTS

Serving size: 100 g/3.5 oz. (raw, mixed species)

AMOUNT PER SERVING	
Calories	92
Fat Calories	13
Total Fat	1.4 g
Saturated Fat	0.4 g
Cholesterol	233 mg
Sodium	44 mg
Protein	16 g
Omega-3	0.49 g

Source: USDA
Photo courtesy of *Charlie Trotter's Seafood* © 1997

COOKING METHODS

- [x] Bake
- [ ] Broil
- [x] Fry
- [ ] Grill
- [ ] Poach
- [x] Sauté
- [ ] Smoke
- [ ] Steam

PRIMARY PRODUCT FORMS

Fresh
- Whole
- Cleaned

Frozen
- Whole
- Cleaned
- Tubes
- Rings
- Tentacles ("skirts")

Value-added
- Breaded or unbreaded strips
- Marinated
- Stuffed
- Canned
- Dried
- Smoked

COOKING TIPS

The secret to tender squid is to cook it either quickly or for around 30 minutes. Rings can be battered and fried; mantles can be stuffed and baked in a sauce. Don't overcook, or squid will turn as tough as a pencil eraser (a couple of minutes are usually enough). If you do overcook, keep cooking for 20 minutes more, and it will become tender again. Braised or baked squid should be cooked this long anyway.

Substitutions Monkfish medallions, Bay scallops, Halibut cheeks

GLOBAL SUPPLY

Seafood Market Terms

additives. Chemicals used in processing seafood to help retain moisture and improve appearance. Also called dips. Any additives used must be listed on product labels. Excessive use of some additives may cause toughening of seafood products or produce off-odors during cooking.

aquacultured. Finfish or shellfish raised in fresh or saltwater pens or ponds or on growing surfaces such as ropes or posts. "Farmed" seafood is grown in highly controlled conditions where water and feed quality can be closely monitored to ensure peak production and quality.

basket shrimp. Small undeveined, breaded shrimp ranging in size from 40 to over 100–count per pound. Also called "mini–shrimp" or "mini–rounds."

batter. A mixture of dry ingredients (such as flours or starches) and water in a ratio suitable for coating.

batter–dipped. Sometimes referred to as batter–fried. Products that have been coated in batter and then immersed in hot oil to secure the batter. These products are then usually frozen.

belly burn. Deterioration in the belly cavity due to enzyme action.

bisulfite (sodium bisulfite). Also called shrimp dip and shrimp powder. Used mostly by shrimp trawlers to prevent melanosis, or black spot.

black spot. A darkening between a shrimp shell and the tail muscle; it develops as the product deteriorates. It is more properly known as melanosis.

blast freezing. Freezing by circulating cold air over batched product placed in trays or racks. Continuous operations are available with rotating belts or spiral screens.

bleeding. Cutting an artery behind the gills while the fish is still alive; bleeding, properly done, improves quality and shelf life of fish.

blocks. Frozen, compressed slabs of fish fillets, usually without skin and bone, used as raw material for value–added products. Blocks usually weigh 16 1/2 pounds.

blocklisting. A procedure of the U.S. Food and Drug Administration that requires automatic detention of imported products and 100 percent approval by the FDA before distribution in the United States.

boned. All primary bones have been removed, although some secondary bones may remain.

boneless fillet. Fillets from which the pinbones have been removed.

Boston cut. A fillet cut that removes most of the nape and leaves a small portion of the pin-bones, which break down when cooked and become indistinguishable from the rest of the fillet.

breading. A food component consisting of flour, bread crumbs, cracked meal or a blend of flour and other ingredients used as a coating.

brined. Often referred to as "pickled" or "wet salted." The process of immersing a fish in a solution of food–grade salt and water for a period of time to allow the fish tissue to absorb a quantity of the salt.

bubble pack. Packaging in which whole–cooked lobster is frozen in brine and packed in a sealed plastic "bubble" with water. Also called "popsicle" pack.

butterflied. A fish fillet or shrimp that has been split. A butterfly fillet is cut along both side with the two pieces remaining joined by a piece of skin and flesh. Butterfly shrimp is peeled and deveined with the shell left on the last tail segment.

bycatch. All marine life other than the target species captured by a fishing vessel. Also known as discards, bycatch can include the wrong size of the target species, other species of fish, starfish, shellfish, jellyfish, sea birds, turtles and marine mammals.

cakes (fritters, dumplings). A mixture of flour or meal; one or more seafood components and other ingredients such as vegetables and seasonings in a batter that is sautéed, fried or baked.

candling. A process by which fillets are placed on a backlighted, translucent table that reveals the presence of parasites in the flesh.

C&P. Cooked and peeled shrimp. Can be deveined as well.

catch weight. Some species with large fillets, like grouper, are sold as catch–weight fillets. For example, if you order a 10–pound fillet, what arrives could range from 9 1/2 to 11 pounds. Suppliers do not want to cut up a natural, 11–pound fillet and have small pieces left over.

caviar. Fish eggs, or roe (usually sturgeon, salmon or lumpfish), that are sorted, washed in cold water and mixed with fine salt. The salted roe is then allowed to ripen for a time.

cellopack. Seafood products, normally fillets, that have been wrapped together in cellophane or polyethylene film and typically packed in 5– or 10–pound boxes. Also called cellowrap.

center cut. The center third of a fillet.

center section. A larger section (thicker than a steak) taken from the center one–third of the body.

chill–killed. A process used in the harvest of aqua-cultured species whereby the temperature of the pond water is lowered until the fish die.

chill–packed. A packing method in which fish are packed in cartons with gel packs and no ice.

chilled. The result of a process in which fish is cooled to a temperature near that of melting ice.

chloramphenicol. An antibiotic that was used in aquaculture until most countries, including the United States, banned its use in food production. Ingested in therapeutic doses of 1,000 to 1,500 milligrams, chloramphenicol can cause aplastic anemia, a potentially fatal bone–marrow condition.

chunk. Also known as a roast. These are cut from the heaviest part of a large fish (typically weighing 5 to 10 pounds). Also refers to pieces trimmed from larger fish and used for stews and kabobs.

ciguatera. An illness caused by eating the toxic flesh of fish caught in tropical and island waters. An area–specific, not species–specific problem, the toxin is believed to originate in microscopic algae that the fish eat. The fish most commonly implicated are amberjack, snapper, grouper, mahimahi, barracuda and reef fish of the Carrangidae (jack) family.

cleaned shrimp. Shrimp that has been peeled and washed, a process that removes some or all of the vein but is not thorough enough to warrant the P&D label.

clipper. Denotes high–quality swordfish or mahimahi, usually caught and frozen at sea.

cluster. A product form consisting of a group of legs and a claw from one side of a crab, with the connecting shoulder area still attached. Also known as a "section."

cocktail claws. Crab claws with end caps removed.

cold–canning. A process in which shellfish (specifically lobster) meat is cooked, picked out of

the shell, packed in cans and frozen without heat–treating. Cold–canned meat must be refrigerated.

cold–smoked. Fish smoked at low temperatures (around 80°F) for 18 hours to several days, producing a moist, delicately flavored product.

collar. The bones of a fish just behind the gills; they support the pectoral fins. The collar is waste when a fish is steaked or filleted. Most headless fish are sold with the collar on because it protects the fish.

Country of Origin Labeling. Legislation adopted as part of the 2002 Farm Bill that requires U.S. retailers to label seafood products as to their country of origin and whether they're wild or farmed. COOL is enforced by the U.S. Department of Agriculture.

counts. The number of shrimp per pound in a given package; i.e., 16/20 means each net–weight pound consists of 16 to 20 shrimp. The larger the count, the smaller the shrimp. Scallop meats are also sold by a count per pound.

cross–contamination. The tainting that can occur when cooked seafoods come into direct or indirect contact with raw seafoods and other raw foods or contaminated surfaces and utensils.

cryogenic freezing. An accelerated form of blast freezing in which products are exposed to sprays of liquid nitrogen or CO_2 at minus 150° F or colder. Used for IQF products.

curing. Using salt or smoke to draw moisture from the flesh of fish or other meats to retard the growth of bacteria.

D

deep–skinned. Removing the fat layer underneath the skin on oily species for milder flavor and improved shelf life.

defatted. See deep–skinned.

depuration. A process used to clean and treat clams harvested from closed or specially regulated areas.

devein. To remove the sand vein (intestine) from the tail section of a shrimp, lobster or other crustacean.

dip. Chemical solutions or additives used to preserve seafood shelf life and prevent drip loss.

dorsal. The top of a fish.

double fillet. Fillets cut from both sides of the fish, with the two pieces remaining joined at the back. Also called "butterfly fillet."

double–frozen. Fish or shellfish that is frozen at sea, thawed for reprocessing in a plant onshore and then frozen a second time. Also called "twice–frozen" or "refrozen."

drawn. Gutted fish with head and fins still intact.

dressed. Whole fish that have been gutted and scaled and from which the gills have been removed. Usually the fins are removed also.

dried. Indicates that seafood has been dehydrated by natural (air, sun) or mechanical means.

drip loss. Weight loss that occurs as a seafood product gives up moisture. Also, loss of moisture during the thawing of frozen seafood.

dry pack. A pack form of chopped clams that contains no clam juice.

dry salting. A coating process used in curing seafood. It helps dry the outside of the product, allowing it to acquire a denser, firmer texture.

E

eviscerated. Gutted.

ex–vessel price. The "dock" price paid to fishermen for their catch.

F

FAS. Frozen at sea.

fancy pack. A term used for top–quality solid canned tuna, each can containing three to four large pieces of premium cuts.

fantail. A shrimp that has been peeled with the exception of the last tail section.

fat line. The fattiest part of a fish, mostly along the belly walls and lateral line. The fat line is often removed for milder flavor and improved shelf life.

feathering. Trimming the fillet to remove the "frill" of small bones around the edge.

fillet. A portion of flesh taken from either side of a fish, cut parallel to the central bones. The main bones, fins and belly flaps are usually removed from finished fillets.

finger pack. A term used for layer–packed shrimp.

finnan haddie. Headed and gutted haddock, split and lightly salted in brine, then cold smoked. Traditionally cooked in butter or cream, the dish originated in Findon, Scotland, where it was known as Findon haddock, which evolved to finnan haddie.

fish sticks. rectangles of fish cut from a frozen block, usually 1 by 3 inches, weighing 1 to 2 ounces each, breaded/battered.

fletch. A fillet cut from large flatfish like halibut and then further divided into boneless portions.

f.o.b. Free on board; the abbreviation is usually followed by a city's name. It is used with quoted prices and indicates that any shipping charges beyond the f.o.b. point are the buyer's responsibility.

freezer burn. White, chalky surface dehydration, most common on corners or narrow edges of product. Excessive freezer burn indicates exposure to cold air and results in loss of natural juices, contamination and rapid oxidation or rancidity.

fresh. Product that has never been frozen, cooked, cured or otherwise preserved.

fresh frozen. Indicates fish were quickly frozen while still fresh.

front section. A large section (thicker than a steak) taken from the forward one–third of a fish's body.

frozen. Fish that have been subjected to rapid lowering of temperature, generally to 0°F or lower, in such a manner as to preserve the inherent quality.

full–nape fillet. Fillet with pinbones in, nape on and tail on. Also called "full fillet" or "whole fillet."

G

gaping. The separation of the individual flakes of meat in a fillet. Gaping can be a natural feature of the fish flesh or a result of poor handling. Also refers to the opened shell of live shellfish. Severe gaping indicates the animal is dead and that the shellfish should not be eaten.

gel pack. A coolant package filled with a combination of water and a gel–type material used for shipping seafood. Coolants are often dyed blue so any leakage is obvious.

glazed. Indicates fish has been dipped in water after freezing. Ice forms a glaze around the fish or meat, protecting it from damage by freezer burn. Fish or shellfish may be "reglazed," or "double–glazed" to ensure adequate protection.

grading. A term for incremental measurement of seafood products, such as counts per pound of shrimp or weight range of fillets.

gravlax. Fillets of salmon rubbed with a mixture of coarse salt, sugar and white pepper, placed meat side against meat–side with mustard and dill and pressed with weights in a chilled environment for at least 24 hours.

green headless. Raw, heads–off, unshelled shrimp; does not indicate actual color.

greening. A rare condition affecting shrimp, caused by thermal abuse and/or contaminants in the breading.

gutted. Fully eviscerated.

H

HACCP. Hazard Analysis Critical Control Point; a mandatory food–safety program implemented by the seafood industry in December 1997 to minimize risk to public health. HACCP requires suppliers to write

Glossary

up and follow a program detailing all points in their manufacturing process where hazards exist; these are the critical control points.

H&G. Headed and gutted.

hard–smoked. Products that have been smoked for up to several weeks.

headed. Fish from which the head has been removed.

histamine. Organic substance produced in the tissue of a fish that has not been properly cooled after harvest. Histamine concentrations produce food–poisoning symptoms in humans. Poorly handled mahimahi, tuna and bluefish are the most commonly implicated species. Also called scombroid poisoning due to its association with the tuna family.

honeycombing. See gaping.

holiday. A condition in which the glaze is missing entirely, an indication of improper glazing.

hot–smoked. Fish exposed to smoke at gradually increasing temperatures (up to 180°F) over a period of 12 to 18 hours, resulting in coagulation of the protein. The product is cooked through, has a dry texture and an intensely smoky flavor.

immersion freezing. Freezing by placing seafood products in direct contact with a refrigerant, which can be applied as a bath or spray, in batch– or continuous–type freezing operations before packaging for subsequent frozen storage.

individually quick frozen. The same as frozen, but indicates the individual forms have been frozen separately, usually by cryogenic means. This prevents the forms from sticking together and facilitates use.

IPW. Individually poly–wrapped.

IQF. Individually quick frozen.

J–cut. A method of removing pinbones that also removes the nape. J–cut fillets are more expensive than other fillets.

Jimmy. A male blue crab.

kipper. To cure (herring, salmon, etc.) by cleaning, salting and drying or smoking.

kosher. Conforming to Jewish dietary laws.

lateral line. A sensory organ along each side of the head and body of fishes, probably for detecting vibrations, currents and pressure.

layerpack. A box of frozen fillets in which the layers are separated by sheets of plastic. Fillets in each layer may overlap and be frozen together.

logs. Swordfish or mahimahi carcasses that have been headed, gutted and tailed, with the belly flaps trimmed.

loin. The central, thick part of a fish fillet, above the belly. Large fillets from fish such as tuna are often called loins. Loins may be cut into steaks.

lox. Mild–cured salmon (soaked in brine for a long periods, then soaked to remove the salt) that has been cold smoked.

marinated. Indicates that the seafood has been cured in an acidic solution, such as vinegar.

Marine Stewardship Council. A London–based initiative founded in 1997 by Unilever and the World Wildlife Fund to offer third–party assurance of a fishery's sustainability. The MSC program certifies well–managed fisheries that meet baseline sustainability requirements, entitling them to carry an MSC eco–label.

market steak. Small steak cut from roasts, usually weighing less than 5 ounces a piece. Also called "round."

melanosis. See black spot.

merus. The meat from the largest segment of a crab leg, adjacent to the shoulder.

methylmercury. A toxin that occurs when mercury, released into the air and water from natural and manmade sources, is biologically transformed. The most toxic form of mercury, it is absorbed by fish and found in highest concentrations in large, predatory species like swordfish and sharks. High levels of methylmercury in the bloodstream of unborn babies and young children may harm the developing nervous system

mince. Fish pieces left over from filleting and trimming, sieved to remove any bones; used for making minced blocks.

molting. The process by which a crustacean sheds its shell to accommodate growth.

muscle line. A line of fat running laterally down the center of a fillet.

nape. The front and thinnest part of a fillet, around the belly.

net weight. Weight of product without packing material or glaze.

ocean–run. Refers to salmon that are still in the ocean and are therefore bright and firm. "Ocean–run" is also used by seafood companies to indicate a pack of random–weight products.

off cuts. Pieces of fillets, often used for fish sticks.

omega–3s. Fatty acids found in seafood and other sources. Research has found that these fatty acids have a beneficial effect on the cardiovascular system and many other aspects of human health.

pan–ready. A fish that has been headed, gutted, scaled and had its fins clipped.

pasteurize. To heat product sufficiently to kill most bacteria, but not enough to cook the meat.

P&D. Peeled, deveined shrimp.

PCBs. Polychlorinated biphenyls. PCBs are a group of synthetic organic chemicals commonly used as coolants and lubricants in electronics until 1977. They do not biodegrade readily and appear in soil, air and water and in animal fat. PCBs are found at various levels in many foods, including seafood.

PDI. Peeled, deveined and individually frozen shrimp.

peritoneum. Membrane lining a fish's belly cavity.

pinbones. A strip of small bones found along the midline of many fillets; can be removed with "V" or "J" cuts.

plate freezing. Freezing by use of a refrigerant flowing through hollow metal plates that are in direct contact with prepacked seafood. Typically the plates are moveable to sandwich the product between two chilled surfaces, compressing it to ensure uniform contact and freezing.

Polychlorinated biphenyls. See PCBs.

polylined carton. A package lined with plastic on the inside to protect seafood products. "Poly-bagged" and "polywrapped" are similar forms of plastic packaging.

popsicle pack. See bubble pack.

portion. Usually a square or rectangle, cut from a block of frozen fish. Weights vary from 1 1/2 to about 6 ounces. May be plain or breaded, raw or precooked.

prawn. In the U.S., a marketing term sometimes used for large shrimp. However, the word is more correctly used for freshwater shrimp species.

previously frozen. Frozen seafood that has been slacked out, or thawed for sale in that state; it should be clearly identified as "previously frozen" product to distinguish it from fresh.

processing block. A block of fillet pieces used for fish sticks.

PTO. Peeled, tail–on shrimp.

PUD. Peeled, undeveined shrimp.

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quarter cuts. Large fillets that have been cut in half.

refreshed. Also "previously frozen." Seafood that has been frozen, often in blocks, then slacked out for resale.

retort pouch. A flexible package made of layered plastic and metallic–colored foil as an alternative to traditional cans. The layers of a retort pouch may be clear or opaque. Most are "see–through" on the top with foil on the bottom, to avoid confusion with vacuum–sealed products.

roe. Fish eggs; used for caviar or sold "as is" to specialized markets.

round. Whole, ungutted fish; shrimp that has been peeled but not split or deveined.

rigor mortis. The temporary stiffening and rigidity of muscles following death. Prolonged rigor mortis helps to maintain fresh–fish quality, because intense bacterial spoilage does not begin until after rigor mortis, with its high acid levels, has passed.

Sally. An immature female blue crab.

salmonella. Bacteria that causes food poisoning, common to meat, poultry and seafood. Effects are unpleasant but normally not life–threatening. Salmonella bacteria are destroyed by proper cooking.

salted. The process of mixing fish with dry, food–grade salt such that the resulting brine drains away.

sashimi. Japanese–style raw fish cut into various forms and served with dipping sauces.

scombroid. See histamine.

scrod. Size designation for cod, haddock, pollock and cusk. Means "small," usually under a specific poundage. Scrod is not a species of fish; sometimes spelled schrod.

Seafood Watch. The Monterey Bay Aquarium's online list and consumer wallet card grading seafood species on environmental responsibility. Among the program's criteria are the species' vulnerability to fishing pressure, stock status, bycatch, habitat and ecosystem effects of fishing gear.

section. See cluster.

semibright. Chum salmon that has been harvested in freshwater, on its way to spawn. Semibrights are also called "brights."

shatterpack. Another name for layerpack. A box of frozen fillets packed so that all pieces are separated by layers of plastic sheeting. In a less–than–perfect pack, layers may stick together. To break the layers apart, the box might have to be dropped to "shatter" the layers.

shelf life. The expected amount of time a seafood product will remain in high–quality condition for consumption. In general, the higher the fat content, the more prone the product is to spoilage and flavor changes. Most of these changes are retarded by cold temperatures.

shrink. Natural weight loss of seafood due to seepage or fluids draining from product, also called drip or purge. Also, loss of seafood product or profitability due to other means, such as discarding seafood too old to sell.

silverbright. A term referring to chum salmon that have been harvested at sea rather than in freshwater.

slacked out. Frozen seafood that has been thawed.

smoked. Fish cured by the action of smoke produced from slowly burning wood or other material, to partly dry the product and impart a smoky flavor.

snap–'n–eats. Crab legs that have been cooked, frozen and scored through the shell so they can be hand–cracked for easy eating.

sook. A mature female blue crab.

split. A fish cut open from the throat or nape to the tail. Gills, guts and roe have been removed, head or backbone may be removed. Also, P&D shrimp cut into two separate halves, attached only at the tail fin. Cooked, frozen red king or snow crab legs or claws, split to expose meat for easy access.

spp. A taxonomic abbreviation signifying more than one species.

steak. A cross–sectional slice of a fish, usually 1/2 to 2 inches thick and containing a section of the backbone.

STP. An additive, sodium tripolyphosphate, used on fish and shrimp to retain moisture.

stuffing. Mixtures of foods and seasonings that may be packed into body cavities, rolled into fillets or otherwise stuffed into or between the seafood.

subcutaneous. Beneath the skin of a fish.

sulfites. An additive used to delay melanosis, or black spot, on raw shrimp. A small percentage of the population is allergic to sulfites, causing the FDA to carefully monitor presence of residual amounts.

surimi. An odorless, white fish paste made from minced fish meat (usually pollock) that has been washed to remove fat, blood, pigments and odorous substances and mixed with cryoprotectants (such as sugar and/or sorbitol) for a good frozen shelf life.

surimi seafood. Analog shellfish products made from surimi that has been thawed, blended with flavorings, stabilizers and colorings and then heat processed to make fibrous, flake, chunk and composite molded products, most commonly imitating crab meat, lobster tails and shrimp.

sushi. Thin, Japanese–style slices of raw fish placed on boiled rice, flavored with rice wine vinegar and rolled in seaweed (nori). Rolls are sliced into bite–sized portions.

sustainable seafood. Seafood farmed or captured in a way that promotes the long–term health of both the target resource and the marine ecosystem.

tail. The thin, tapered, tail–end portion of fillets. Also applies to meaty tail section of lobster and shrimp.

tray pack. A seafood packaging form in which a product is prepackaged on a shallow, clear or foam–plastic tray, overwrapped with transparent, plastic film. An absorbent paper pad, covered with plastic to avoid sticking to the product, is sandwiched between the product and the tray to draw off moisture.

trimmed. Finfish on which the fins and tail have been removed.

tripolyphosphate. An additive, used as a dip, that reduces natural drip loss in fillets.

V–cut. A method of removing pinbones by making a V–shaped cut along both sides of the pinbone strip, leaving most of the nape.

vein. Also called the sand vein. The intestinal tract that carries waste from a shrimp's stomach along the dorsal side of the tail for excretion. Deveining is done primarily for the sake of appearance and texture. Lobster tails also have veins that should be removed.

viscera. Intestines. Eviscerated means gutted.

watermarked. Describes the darkened, dulled skin of a salmon as it sexually matures and enters freshwater prior to spawning.

wetlock. Wax–coated cardboard used for shipping fish packed on ice.

wheel. Cross–sectional center cut from large species like sharks and swordfish from which steaks are then cut.

whole fish. The complete fish just as it comes from the water, also called landed or round weight.

yield. The percent of meat recoverable from a fish or shellfish.

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Cooking/Culinary Arts & Techniques

The only professional seafood reference you need

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